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OCCURRENCE OF *LARUS GLAUCESCENS* AND OTHER AMERICAN BIRDS IN HAWAII.

BY H. W. HENSHAW.

A CERTAIN interest attaches to the occurrence of birds in regions far distant from their customary bounds because such occurrences indicate one of the ways in which species are distributed. More than usual interest attaches to the occurrence of foreign species in the Hawaiian Islands because of the remoteness of the Island from continental areas, California, the nearest mainland, being some two thousand miles distant. The following desultory notes, therefore, will not be without value.

GLAUCOUS GULL (*Larus glaucescens*).

This Gull is becoming an irregular though a rare visitor to the island of Hawaii, following vessels from San Francisco to Hilo. I learn from the captains of several vessels sailing between the two ports that the numerous Gulls that frequently attend the course of outward bound vessels usually turn about when off shore a hundred miles or so. Occasionally, however, one or two Glaucous Gulls, for some reason or other, fail to join their fellows on their homeward course, and day after day steadily follow in the course of the Island bound vessel. Such birds frequently, perhaps always, roost at night upon the yards.

Recently two Glaucous Gulls followed one of the U. S. transports from San Francisco clear into Hilo harbor where they lingered for several weeks and then disappeared, no one knows where. This particular transport happens to be painted white, which fact recalls the statement of an old mariner that Gulls are much more likely to follow in the wake of a white vessel than of any other, the simple explanation being that the birds are not so likely to lose track of a white vessel.

I have examined two Glaucous Gulls, shot in Hilo harbor, during my five years' residence in Hilo out of five or six that have been reported in this interval. One of them was in fine condition but the other weak and much emaciated.

I believe that none of these wanderers ever attempt to return to America but their final fate is unknown. No hint of the Glaucous Gull establishing itself upon the Hawaiian Islands is recorded, so far as I know, and the Islands are but illy adapted to their habits. The bird islands to the northwest, Laysan and others, would seem to be in every way adapted to this bird, and there in time the Glaucous Gull may become established.

That other species of American Gulls occasionally find their way to the Islands in the wake of vessels, especially to the harbor of Honolulu, is highly probable, and only the paucity of observers has prevented their detection and record.

BROWN GOONEY (*Diomedea chinensis*).

Every outward bound steamer and sailing vessel is met when well off shore from San Francisco by a number of Brown Goonies that fall into the vessel's wake and attach themselves to her till within a few hundred miles of the Islands, occasionally till within sight of port. As this Albatross was found by Mr. Rothschild's collector, Mr. Palmer, breeding abundantly upon Laysan there is nothing surprising in the above save the very business-like way the birds have of following vessels for the sake of the few scraps of meat thrown overboard, and the added fact that the Goonies also roost upon the vessels' yards at night.

RED-BREASTED MERGANSER (*Mergus serrator*).

I am not aware that this Duck has hitherto been recorded from the Islands where it is a casual and possibly a rather regular winter visitor. Nov. 8, 1899, one of these Mergansers was shot by Mr. Otto Rose of Hilo near the town, being one of two seen. Nov. 28, I shot the surviving bird a mile or two further down the coast in a small salt water pond. It was fat and in fine order, and had in its throat two of the common fresh and brackish water fish known to the natives as Oopu.

The natives, to whom I showed this Duck, seemed in nowise surprised, claiming to have seen the species before though rarely. They gave it the name Mohá, but as this name is applied also, according to Mr. Dole, to the Shoveller its correct application is open to doubt. Present day natives know extremely little of Hawaiian birds and usually are either unable to name a bird at all or are in doubt.

In time, no doubt, as stated of the Gulls, particularly all the species of our northwest Ducks will be noted from the Islands, nothing being more likely than that a few stragglers will accompany the flocks of Shovellers and Pin-tails which are regular winter visitors.

RED PHALAROPE (*Crymophilus fulicarius*).

Brother Matthias of the Catholic Brotherhood has a mounted specimen of this bird in winter dress which he shot, together with several others, on the island of Mani in December, 1894. So far as I am aware this is the first record of the bird's occurrence upon the Islands. Brother Matthias informs me that the Phalaropes frequent some small inland ponds at Kahalui and are of not uncommon though irregular occurrence, two or three years often elapsing between their visits.

At the same time and place Brother Matthias shot two American Curlews (not the Bristle-thighed) which I judge from his description to be probably *Numenius hudsonicus*. These speci-

mens are still extant, and later I hope to be able to see and to identify positively the species.

Since the above was written I shot another Red Phalarope from a flock of Akekeke (*Arenaria interpres*) on the Hawaiian coast near Hilo, April 6. The bird may yet be found to be an irregular winter visitor to Hawaii, coming down with the flocks of Plover and Turnstones. That it should associate with the Turnstone, and with them feed in the upland cane fields, is rather remarkable. The flock from which my specimen was shot was on its way from upland to its roosting places on the coast.

SANDERLING (*Calidris arenaria*).

This species is recorded from Kanai by both Stejneger and Wilson. It appears to visit the Kau and Kona coasts of Hawaii annually in small numbers. In October, 1899, I shot two individuals at Kaalualu, Kau, and Mr. Sam Kauani, a resident who is well posted on the shore birds of the locality, assured me that it was by no means uncommon, and sometimes was seen in small flocks, oftener one or two in company with the Akekeke (*Arenaria interpres*).

WILSON'S SNIPE (*Gallinago delicata*).

Mr. George C. Hewitt, Manager of Naaleho Plantation, Kau, informs me that he killed a 'Jack Snipe' near Naaleho some years ago. Mr. Hewitt is a sportsman and is very sure that the bird was no other than Gallinago with which he is well acquainted.

I feel sure that Island records of the shore birds of the northwest will multiply as time goes on. The immense flocks of Plover and Turnstone that each year wend their way from the American coast to the island must surely prove a magnet to attract other species hither, to say nothing of occasional individuals that mingle with these species in migration and unwittingly accompany them in their flight till all unwittingly they find themselves on foreign shores.

The whole subject of the migration of the Plover and other species to and from the distant mainland is of exceeding interest. Especially interesting would be any book bearing upon the manner of these migrations and the time taken in the flight.

As is well known, both the Plover (*Charadrius dominicus fulvus*) and the Akekeke (*Arenaria interpres*) leave the Island early in May in immense numbers and return in August. My friend, Mr. Patton, of Hakelau, Hawaii, has several times observed parties of Plover making the land, and always in a tired, if not an exhausted, condition. Once on land they seem to desire nothing but a chance to rest, but soon recuperate and go to feeding.

Capt. Chas. Watson has captained ships for years between San Francisco and Hilo. He tells me that only twice has he seen migrating birds, once flocks of Ducks flying north from the Islands, and once great numbers of Plovers[1] taking the same course. It is worth noting that in both instances this vessel was about 2000 miles to the north and west of Hawaii, and the inference is that the birds were steering a straight course for the Aleutians. I hope to learn of other masters of vessels who can furnish notes upon this subject, and especially do I hope to find some one who has seen the migrating flocks of Plover resting upon the ocean. For it does not seem probable that such good swimmers as are the Plover and Turnstone attempt to make so long a flight without rest, even if their powers of wing are equal to a task of such magnitude, which may be doubted.

In the above connection a note by Mr. Rothschild's collector, Mr. Palmer, is of great significance. He says (Avifauna of Laysan, Pt. I, p. 14), "A Kolea .... flew also round the ship and considerably astonished me by settling on the water several times to rest." This was in August and the bird most probably had just made the downward trip from Alaska. If Plover and Turnstone rest freely upon the oft times calm Pacific, their passage over such long distances is more readily comprehended. That the Ducks can and do rest upon the ocean when tired, is not to be doubted. Even so, however, it is a mystery that birds should

[1] The term Plover upon the Islands usually includes both the Plover proper and the Akekeke, few discriminating between the two birds.

venture so far for a few months' sojourn upon the sunny Pacific Isles. However favorable the conditions, the trip must be full of hardship and danger, especially to the old, the young, and the sick, and doubtless thousands occasionally perish on the way, particularly in stormy weather. Why leave the safe mainland for islands twenty-five hundred miles away? In this connection it is of interest to note that by no means all the Kolea and Akekeke and Ulili (*Totanus incanus*) leave the Islands in spring. Thousands of the two former species remain all summer in the uplands and the Ulili is by no means uncommon along shore. I have examined numbers of such loiterers and find them, without exception, to be young birds, apparently birds of the year probably too immature to feel the mating impulse.

Adult birds on the contrary, shot in April, which already have assumed the nearly complete nuptial dress, reveal clearly upon dissection the effect of the all controlling passion, and I am not sure that in some cases they are not already paired before leaving the Island. Some wounded adult birds must preforce remain behind while their fellows, in obedience to the homing instinct — the strongest impulse that stirs the avian breast — seek the Alaskan tundras. Why do not such island prisoners breed? Food would seem to be abundant here in summer as in winter, and so far as temperature is concerned, the flanks of the lofty Hawaiian mountains offer any temperature from that of perpetual summer to everlasting winter.

NOTES ON THE BREEDING HABITS OF THE AMERICAN GOLDEN-EYED DUCK OR WHISTLER (*CLANGULA CLANGULA AMERICANA*).

BY WILLIAM BREWSTER.

Plates VI and VII.

In 1897 I spent the last two weeks of May and nearly the whole of June at Lake Umbagog, living in a house-boat and devoting my time to studying and photographing birds and nests. Besides a cook and a man to manage the boat, I had with me two assistants, Mr. R. A. Gilbert, who helped me in various ways, and Mr. Clarence H. Watrous, a keen and persistent nest-hunter, to whose tireless efforts I was indebted for the subjects of some of my best notes and pictures. Our floating house proved admirably adapted to the purposes of such a trip, having, in addition to comfortable living and sleeping accommodations, a small but well arranged dark room in which the negatives were developed. By sculling when the weather was calm, with the aid of a sail when there was a favoring breeze, we were able to change our ground whenever we wished to do so, although we often found it profitable to spend several days, and occasionally as much as a week, in one place, moored to the shore at the head of some sheltered cove, where the songs of shy forest birds rose on every side, and the delicious scent of the balsams stole in through the open cabin windows, or riding at anchor sufficiently far out in the lake to escape the black flies and mosquitoes. Our daily excursions were made chiefly by water in canoes, and extended not only to every part of the lake, but for considerable distances up the rivers which flow into it. Altogether it was a delightful experience, full of interest, and not wanting in novelty, despite the fact that the region was one with which I had long been familiar.

During this season I learned much that was new to me concerning the breeding habits of the Golden-eyed Duck or Whistler. This species still nests abundantly at Umbagog, especially about the outlet and throughout the bottom lands of the Lower Megalloway River, where the forests were killed half a century ago by

the back water from the dam at Errol. Many of the trees have fallen or been cut away by the lumbermen within recent years, but enough remain to furnish nesting places for numerous Tree Swallows, Bronzed Grackles, Woodpeckers, and Whistlers, besides a few Wood Ducks, Hooded Mergansers, and an occasional pair of Goosanders.

All the Whistlers' nests which I have examined have been placed over water at heights varying from six or eight to fifty or sixty feet and in cavities in the trunks of large hard wood trees such as elms, maples, and yellow or canoe birches. As the supply of such cavities is limited, even where dead or decaying trees abound, and as the birds have no means of enlarging or otherwise improving them they are not fastidious in their choice, but readily make use of any opening which can be made to serve their purpose. Thus it happens that the nest is sometimes placed at the bottom of a hollow trunk, six, ten, or even fifteen feet below the hole at which the bird enters, at others on a level with and scarce a foot back from the entrance, which is usually rounded, and from six to fifteen inches in diameter, but occasionally is so small and irregular that the Whistler must have difficulty in forcing its bulky body through. I remember one nest to which the only access was by means of a vertical slit so narrow and jagged that it would barely admit my flattened hand.

The eggs are laid on the rotten wood or whatever other debris there may be at the bottom of the cavity. When the set is complete (never before, so far as I have observed) the bird places under, around, and even over the eggs, down plucked from her breast. The quantity of down varies greatly in different nests. Sometimes there is only a very little about the sides and bottom of the cavity; often the eggs are warmly banked and completely covered with down, while there is usually more or less clinging to the edges of the entrance hole.

The number of eggs in a completed set varies greatly. Occasionally there are but five or six, oftener from eight to ten, not infrequently as many as twelve or fifteen, while I once found nineteen, all of which almost certainly belonged to one bird. It is by no means uncommon, however, for two females to lay in the same nest, and several of the rounded, pure white, thick-shelled

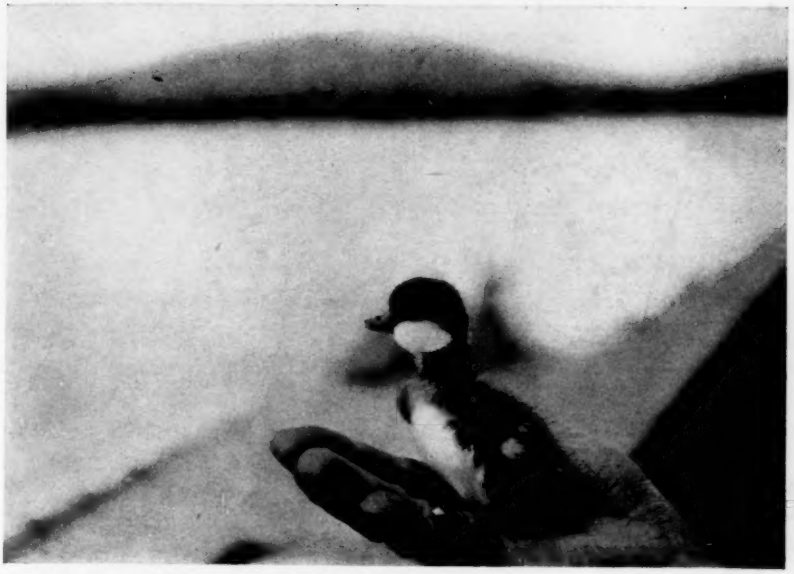

FIG. 1. YOUNG WHISTLER, TWO DAYS OLD.

FIG. 2. NEST WHICH THE YOUNG WHISTLERS WERE SEEN TO LEAVE.

eggs of the Hooded Merganser are sometimes included in a set of the green, thin-shelled eggs of the Whistler. The whole bottom of the nesting cavity, be it large or small, is usually covered with eggs, and they are often piled in two layers or set on end, and packed so closely that it is as difficult to remove the first as to take a book from a tightly filled shelf.

I used to suppose that in the cases of composite sets the labor of hatching the eggs and rearing the young was performed, however unwittingly or unwillingly, solely by the original owner of the nest, or, in other words, that the Ducks which laid in the nests of other birds, whether of their own or of a different species, were simply parasitic, after the manner of the European Cuckoo and certain of the Cowbirds, but in 1897 I obtained evidence which seems to point to a different conclusion, at least as far as the Whistlers are concerned. Most of this evidence, as well as certain other observations on the breeding habits of the Whistler, is contained in the following notes, which I give nearly as I find them in my journal.

May 30. We sailed the house-boat up the Lake to-day and anchored near the edge of the flooded forest at the outlet where we intend spending a week or more. Soon after reaching this place we saw four female Whistlers flying together in a peculiar manner over the trees, now rising high in air, next descending and dashing among the trunks and branches, vibrating their wings rapidly and continuously as in ordinary flight, but describing circles about a remarkably tall stub with a shattered top. Around this they would pass a dozen times or more, gradually drawing nearer until one bird leaving the rest and pitching first downward, then sharply upward, would fly directly toward the stub and try to alight on its jagged top. The attempt usually failed, when the bird, continuing its flight, would disappear among the trees, presently returning to begin circling again; but twice it gained a foothold and remained perched for several seconds, although it had to keep its wings in constant motion to maintain its balance. Sometimes its flight was directed to a point near the top of the tree where there was a round, neat-looking hole, no doubt the entrance to a nest, for we afterward saw two Whistlers emerge from it in quick succession. We thought that all four birds tried in turn either to

alight on the stub or to enter the hole, but as we could not distinguish between them, and as no two made the attempt at the same time, this impression could not be verified. They were silent for the most part, but occasionally one of them would utter a sound not unlike the quack of a Black Duck but shorter and flatter and repeated very rapidly six or eight times.

May 31. In a short, hollow maple trunk where a Whistler nested last year we found this morning a set of eleven eggs, none of which were covered with down although they were evidently near hatching. This nest is within thirty yards of the tall stub about which the four Whistlers were circling yesterday. The entrance is at the top about twelve feet above the water.

June 2. We found a Whistler's nest to-day by watching the female. She first alighted on the water near the tree and for fifteen or twenty minutes swam or drifted idly about preening her feathers. Then she flew out over a space of open water and turned back toward the tree, describing a great loop and rising gradually until she had attained an elevation of about twenty feet when she made directly for the entrance to the nest, which was about thirty feet above the water. On nearing it she pitched up sharply for the remaining ten feet, keeping her wings in rapid motion up to the last moment, but checking her speed very considerably before she reached the hole. Some intervening branches prevented us from seeing just how she entered it. Approaching the tree quietly I took a position which commanded a good view of the hole when my companion struck the base of the trunk lightly with his paddle. The blow was immediately followed by a scratching sound, and the next instant the Whistler shot out over our heads. Although I was watching the hole intently I did not see her leave it. She seemed, indeed, to burst forth at nearly full speed and I was half inclined to believe that she began her flight within the trunk. It seemed incredible that so heavy and clumsy a bird could emerge from such a place so adroitly and get under headway so quickly. Not that this particular hole was exceptionally small. On the contrary it was of rather generous size. Its shape and position are illustrated by a photograph which I took of the tree.

June 7. Yesterday at 3 P. M. Watrous examined the Whistler's nest found May 31. Several of the eggs were chipped. This

evening, just before sunset, he found all but two hatched and the nest filled with the pretty ducklings. The old bird was sitting on both occasions. To-night she returned and reëntered the hole before Watrous had paddled one hundred yards from the tree.

June 8. I visited the Whistler's nest shortly before daybreak this morning, approaching it with great caution. The old bird was absent and at first I feared that she had removed her young during the night, but on looking into the hole I was delighted to find them still there, huddled closely together in a circle, and shivering a little, for the air was keen. There were, however, only *six* of them with the two eggs still unhatched. What can have become of the remaining three eggs or young? Watrous tells me that he did not count the eggs on the 6th, nor the young last evening, but he is very certain that none of the eggs were missing on the former occasion, for the nest seemed to be full of them, and the absence of as many as three would have left a gap that he could scarcely have failed to notice. He is less sure that there were more than six young and two eggs last night.

Feeling confident that the young would leave the nest sometime during the day, I determined to see, if possible, how they would accomplish it. Accordingly after examining the nest, I concealed my boat about thirty yards from the tree and stretching myself at full length on the bottom, with my head raised just enough to enable me to look over the gunwale, remained there for nearly two hours. Nothing of interest happened until 5.10, when a female Whistler came from the direction of the Megalloway and without any preliminary circling dropped into the water within a few yards of the nest tree. After floating motionless for about two minutes with head and neck erect, evidently watching and listening intently, she flew directly to the hole and alighting on its edge, perched there for an instant, flapping her wings a little to maintain her balance. She then popped in, throwing up her spread tail just as her body disappeared, much as a Duck does when diving. I saw nothing more of her during the next hour, but soon after she entered the nest two other female Whistlers flew over and around me several times and one of them finally alighted on the water and swam to the base of the stub, looking up at the hole intently as if she, too, had some interest in it. On

several occasions within the past few days we have seen three or four Whistlers hanging about this nest. These facts lead me to suspect that they have been taking turns at incubating the eggs and that one of them may have taken away the three missing young.

At 6.15 I returned to the house-boat for breakfast and Gilbert took my place. It was arranged that he should shout if the Whistler began taking out her young while I was away. I heard his signal just as I was preparing to go back and when I rejoined him found that I was too late. This is his account of what happened during my absence:—

"At 6.45 the old Duck appeared at the entrance to the nest, where she sat for five minutes moving her head continually and looking about in every direction included within her field of vision; then she sank back out of sight, reappearing at the end of a minute and looking about as before for another five minutes. At the end of this second period of observation she flew down to the water and swam round the stub three times, clucking and calling. On completing the third round she stopped directly under the hole and gave a single loud cluck or call, when the ducklings began scrambling up to the entrance and dropping down to the water in such quick succession as to fall on top of one another. They literally *poured* out of the nest much as shot would fall from one's hand. One or two hesitated or paused for an instant on reaching the mouth of the hole but the greater number toppled out over the edge as soon as they appeared. All used their tiny wings freely, beating them continuously as they descended. They did not seem to strike the water with much force.

"While this was going on the old Duck sat motionless on the water looking up at the nest. When the last duckling dropped at her side she at once swam off at the head of the brood, quickly disappearing in a flooded thicket a few rods away."

In this connection it may be well to dwell for a moment on some of the statements which have been made by writers as to the manner in which the young of tree-nesting Ducks leave the nest. Dresser affirms (Birds of Europe, VI, p. 600) that the young of the European Golden-eye "are carried by the female in

FIG. 1. WHISTLER'S NEST WITH NARROW ENTRANCE.

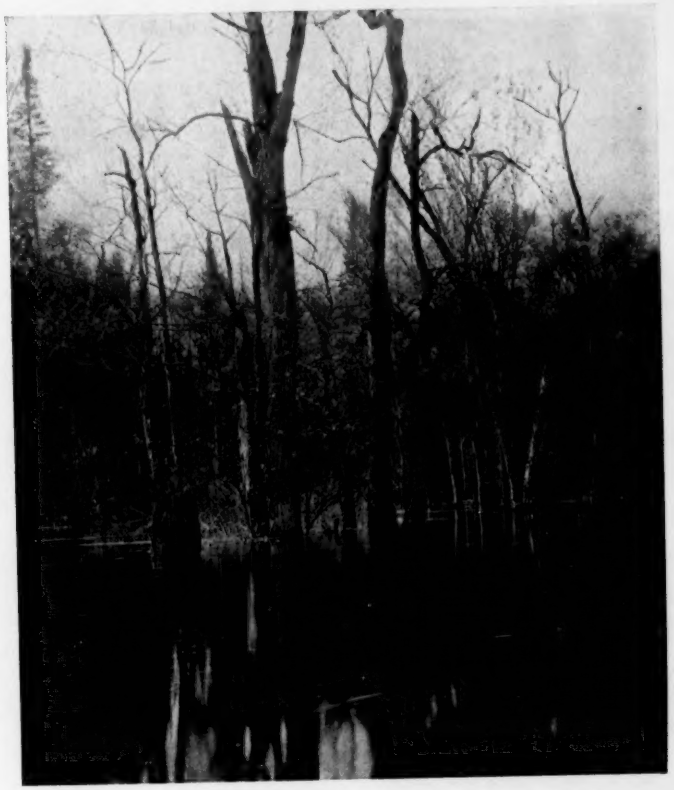

FIG. 2. WHISTLER'S NEST WITH ROUND ENTRANCE.

her beak down to the ground or to the water, one after another being taken down until the whole brood is taken in safety from the elevated nesting place; and I have been assured by the peasants [of Lapland and Finland] that this always takes place in the dead of the night."

Wilson was told by a person who lived within twenty or thirty yards of a tree in which a pair of Wood Ducks had nested for four successive years that "he had seen the female, the spring preceding, carry down thirteen young, one by one, in less than ten minutes. She caught them in her bill by the wing or back of the neck, and landed them safely at the foot of the tree, whence she afterward led them to the water."

Audubon, in his justly celebrated account of the Wood Duck — one of the best and most complete bird biographies that has ever been written — says: "If the nest is placed immediately over the water, the young, the moment they are hatched, scramble to the mouth of the hole, launch into the air with their little wings and their feet spread out, and drop into their favorite element; but whenever their birthplace is at some distance from it, the mother carries them to it one by one in her bill, holding them so as not to injure their yet tender frame. On several occasions, however, when the hole was thirty, forty, or more yards from a bayou or other piece of water, I observed that the mother suffered the young to fall on the grasses and dried leaves beneath the tree, and afterwards led them directly to the nearest edge of the next pool or creek." (Birds of America, 1843, Vol. VI, p. 273.)

Mr. Fred Mather has contributed the following account of how young Wood Ducks, bred in captivity, leave the nest: "Some writers claim that the mother takes them in her bill and others say that she carries them on her back. I had a string of pens back of my house; a pair in each, for they are better to be separated, and usually I found the mother and her brood on the water in the morning; but on two occasions I saw them leave the nest. The mother went first to the pool and called; she had brooded them for twenty-four hours or more, and they were strong. Then one after another the little things climbed out of the box and tumbled to the ground, or to the water.

"They had to climb 4 to 6 in. of plain board, but they did it.

I have seen them climb a 10 in. base board and go through 1 in. poultry netting when alarmed. They weigh nothing worth mentioning, and they have claws as sharp as cambric needles. They have pricked my hands until they bled when pinioning them at eight weeks old. I can easily believe that they can climb up a hollow tree and drop 20 ft. into the grass without injury. What need of such sharp claws and climbing ability if not for leaving the nest?" (Forest and Stream, Vol. LII, March 18, 1899, p. 205.)

Audubon's assertion that the female Wood Duck occasionally carries her young in her bill is so brief and guarded in comparison with the remainder of the vividly written paragraph in which it occurs as to suggest that it may not have rested on his personal experience, while Wilson's account was confessedly, and Dresser's quite evidently, taken at second hand and on the evidence of obscure and untrained observers. It is by no means impossible, of course, that tree-nesting Ducks occasionally take their broods to the water in the manner described by these and other writers, but if this be so the fact remains to be definitely established.

During my first visit to the Whistler's nest this morning I removed one of the young and took it with me to the house-boat, intending to return it after breakfast. The sudden departure of the mother with the remainder of her brood frustrated this plan and I kept the pretty little creature for two days, glad of the opportunity to try a few experiments with a wild Duck which had never seen water. I first put it on the deck where it ran about freely, standing and moving in a nearly erect position, lying prone with half extended wings when tired. It frequently called *peep-peep-peep-peep-peep-peep* in shrill, piping tones, much like a young Turkey. It did not appear to be either shy or apprehensive, but, like many young birds, it was exceedingly stubborn and wilful, giving me the greatest trouble to photograph it, absolutely refusing to remain where I posed it, although it would settle quietly enough almost anywhere else. I next put a shallow pan filled with water near it. It ran back and forth through the pan many times without taking the least apparent notice of the water.

Shortly after this it was placed suddenly but gently in a tub filled to the brim with water. For at least a minute it remained

floating in one spot, looking about with evident bewilderment, but seemingly without fear. Its feet and legs hung loosely down and were occasionally twitched slightly. Presently it began using them as paddles, slowly and hesitatingly at first, afterwards more confidently, although more than an hour passed before it learned to swim at all fast or vigorously.

When it had mastered this accomplishment it tried climbing over the edges of the tub. We then removed about half the water, but the little bird went up the sides almost as nimbly as a mouse, clinging with its tiny claws to the soft wet wood. By noon it had learned to leap ten or twelve inches straight upward either from the water or from the bottom of a box. The muscular power and vigor of its stout legs were indeed remarkable, and it seemed to get as firm resistance for an upward leap from the water as from the surface of a board. One of the first things it did on being placed in the tub was to begin picking up various small objects such as bits of bark or weed which were floating in the water. It apparently swallowed some of these fragments, but we were unable to find any food which it seemed to relish, although it was quite willing to try everything we offered it. It ate a very little egg yolk, and some wriggling fragments of earth worms excited it greatly at first, but after getting them well down its throat it ejected them with evident disgust. While engaged with them it dropped a piece which began sinking slowly. It at once thrust its head beneath the water and tried to catch the descending morsel. This was the nearest approach to diving that we saw it make. It drank often and copiously and bathed freely, afterwards preening and drying its downy plumage with great patience and thoroughness, using its bill like an old bird.

The following morning our little Whistler was alive but feeble and depressed. As it would eat nothing that we had to offer, we took it to the flooded forest and putting it on a piece of floating driftwood near the foot of the tree in which it had been hatched, backed the boat off a few yards and left it at freedom. It stood erect and motionless for a minute or two looking about; then entering the water began swimming, at first slowly and in evident bewilderment. But very soon it gained confidence and struck out more boldly until at the end of a few minutes it was

darting hither and thither, skimming the surface as lightly as a fluff of thistle down and in courses as erratic as those of the lucky bugs whose gambols it disturbed. Now it sipped the water eagerly, next picked at a floating leaf or darted after some small aquatic insect. Every now and then it would raise the forward part of its body and flap its tiny wings in the manner of an old Duck. The floating sticks and rafts of dirt that covered a large part of the surface did not embarrass its progress in the least, for it crossed them either by running or by a succession of short, quick leaps as nimble as those of a small frog. Poor little waif! It was pathetic to see it start off thus alone and unprotected on its perilous journey of life, rejoicing evidently in its freedom and the novelty of its surroundings, but quite unconscious of the dangers which lay before it. I could only hope that one or the other of the female Whistlers which we started from the water near the nest tree would adopt and care for it, and I was glad to see one of them fly back to the spot after we had departed.

ECOLOGY OF THE MARYLAND YELLOW-THROAT, AND ITS RELATIVES.

BY WILLIAM PALMER.

FOR MANY years I have known that two distinct forms of th common species (*Geothlypis trichas*) occurred in Virginia; a sma summer resident and a larger, better colored transient. Within a few years past I have found a third, a large, rich colored summer resident of the cypress and cane swamps of the southeastern part of the State. A study of considerable material and experience has led me to results which may throw more light on the distribution and evolution of the genus.

The genus *Geothlypis* has no characters peculiar to itself; it is differentiated from its near relatives by a combination of characters each of slight importance. It contains about 28 forms, dis-

tributed over most of North and Central America and part of South America, from sea level to about 6000 feet, and exhibits considerable diversity in extent and intensity of color areas, especially in the males. These color values, together with slight structural characters, permit of the forms being arranged in nine natural geographical and evolutional groups. Without violence, the genera *Microligea* (Santo Domingo) and *Teretristis* (Cuba) may both be included in *Geothlypis*. The former, *G. palustris*, is a tropical *G. agilis*, and the latter, *G. fornsi* and *fernandinæ*, are ancestral representatives of *Geothlypis*, and but slightly specialized.

Natural groups of Geothlypis as shown principally in the Males.

1. No black, grayish above, yellow beneath.
   - *fornsi*, Cuba.
   - *fernandinæ*, Cuba.
2. Head, neck and breast slaty, short wings, long tail, ♀ slightly slaty.
   - *palustris*, Santo Domingo.
3. Head, neck and breast slaty with slight black areas, long wings, short tail, ♀ nearly similar.
   - *agilis*[1], British America.
   - *tolmiei*, Western U. S.
   - *philadelphia*, Eastern U. S.
4. Pale slaty, and black face bands, absent in ♀.
   - *a.* strongly marked, continental.
     - *brachidactyla*, Northeastern U. S.
     - *trichas*, Eastern U. S.
     - *roscoe*, Southeastern U. S.
     - *occidentalis*, Western U. S.
     - *melanops*, Northeastern Mexico.
   - *b.* less definite, insular.
     - *rostrata*, New Providence Id., Bahamas.
     - *tanneri*, Abaco Id., Bahamas.
     - *coryi*, Eleuthera Id., Bahamas.
5. Yellow and black head bands, rich coloration, ♀ without black.
   - *beldingi*, Lower California.
   - *flavovelata*, Southern Mexico.
   - *flaviceps*, Southeastern Mexico.
6. Black face band, broad and short, very rich coloration, ♀ without black.
   - *cucullata*[2], Southern Mexico.
   - *speciosa*[2], Southern Mexico.
   - *bairdi*, Western Central America.
   - *cheriquensis*, Northern Colombia.
   - *semiflava*, Colombia.
7. Facial black short and narrow, slaty crown patch, rich coloration, ♀ without black.
   - *æquinoctialis*, Northern S. America.
   - *auricularis*, Peru.
   - *velata*, Brazil.

[1] Subgenus *Oporornis*.

[2] Slight slaty crown patch.

8. Slight facial black, short wings, long tail, pale coloration, grayish dorsum ♀ without black. Subgenus *Chamæthlypis.*	*ralphi*, Northeastern Mexico. *poliocephala*, Mexico. *palpebralis*, Mexico. *caninucha*, Guatemala. *icterotis*, Costa Rica.
9. Short and broad facial black, slight slaty crown band, sexes nearly similar.	*formosa* [1], Southeastern U. S.

In groups 4, 5, 6 and 7 there is a sequence of structure and color values, largely geographical and not present in the other groups. Seemingly, group 8 continues the sequence from group 7. The intense, rich coloration of group 6 evidences the values of a moist tropical habitat. The short boreal summer residence of group 3 has hardly effected their color values. The habitats of all the groups except 8 and 9 do not overlap in summer, they rather meet and often intergrade. The ranges of 8 and 9 overlay the general habitats of some of the others, but the local environments are quite different. The differences between the forms do not always indicate a variation from a contiguous form, but rather a specialization from an ancestral generalized type through environmental influences.

In all the forms, except groups 3 and 9, the wings are well rounded, the outer primaries being quite short, the third or fourth being the longest. This is a character common to all non-migrating and especially sedentary tropical species. In *agilis* of group 3, the wing is long and pointed, the outer primary being as long as, or, in fully adult birds, slightly longer than the second. In *tolmiei* and *philadelphia* an intermediate stage is evident, and these are birds of fairly high altitudes with a long migration. As we pass southward and toward sea level in the habitats of these birds, we find that the outer primary decreases in length, thus, *brachidactyla* has a longer and more pointed wing than any of group 4, because it migrates further, it goes further north and south. As the birds of group 3 and 9 and *brachidactyla* of group 4, migrate more extensively than any others of the genus, it is evident that the long, pointed wing with a long outer primary, as compared with the short, well rounded wing and short outer primary of their slightly migrating or sedentary relatives, is an index

[1] Subgenus *Oporornis.*

of the length and character of the migration, *and have been caused by migration.*

While the color values as here given (largely psychological characters) exist strongly in the males, many of the females show a tendency in the same direction. The females of *formosa* especially are very like the males and are thus further advanced in this species, but many of the older females of other species exhibit a tendency toward the marking and coloration of the males of their respective species. This is especially true of the more tropical forms. The strong color differences between the sexes of most of the forms are evidently derived from the superior activity of the male, plus the necessary secretive characteristics of the female. Where, however, the showing off habits of the males are slight, natural selection has permitted the females to acquire an almost similar plumage to the males, as in *formosa*. The subdued character of the song of this species, its secluded habitat and its ground habits have permitted the female to attain nearly similar plumage conditions and has retarded greater specialization of the male.

Judging from all the characters, the *fornsi* and *poliocephala* groups would seem to be the least specialized, while *occidentalis* and *brachidactyla* occupy the other extreme.

Another interesting feature is shown in the comparative lengths of the tails and wings, non-migratory lowland forms having relatively shorter wings and longer tails, while mountainous dwelling and high northern forms have relatively longer wings and shorter tails. These characters, dependent upon altitudinal and northern habitats, are less strong in the immature, but are attained by age and experience.

The white and slaty crown band of the *trichas* group changes in Mexico and lower California to a yellow band, which in Central America is entirely lost, the green of the back becoming greatly intensified and abruptly joining the facial black.

THE TRICHAS GROUP.

Their abundance, and the low bushy-ground nature of their habitat fit these birds to take advantage of general climatic

changes as geological influences have affected the topography, and, therefore, we might expect to find a great variation among the characters most likely to be affected. As these influences have acted gradually through a long series of years upon somewhat different material, it follows that results will be different, according to the distances between the geographical areas examined, because the influences are more dominant at one point than at some other. The forms here recognized and their values and distributions are as follows:

Geothlypis trichas AND SUBSPECIES.

Adult ♂ in spring: Above olivaceous brown, darker on wings and tail; beneath yellowish, stronger and brighter on throat, breast, and under tail-coverts; sides of breast olivaceous; forehead and face black, bordered posteriorly by ashy white; bill blackish, deeper than broad, tapering to a point; wings short and rounded, outer primary shorter than next; tail shorter than wing, well rounded; feet flesh colored; tarsus longer than midtoe, lateral toes nearly equal and as long as midtoe minus claw.

Adult ♀ in spring: Similar to male but smaller, less richly colored and without black; a faint loral stripe; ear-coverts darker than grayish face.

Immature and winter adults: Similar to summer specimens of the same sex, but with the face markings less strongly defined and less extensive; coloration richer with a browner dorsum.

The Subspecies.

Geothlypis trichas trichas. MARYLAND YELLOW-THROAT.

Turdus trichas LINNÆUS, Syst. Nat. ed. 12, 1776, 293. Type locality, Maryland.

Adult ♂ in summer: Smallest; above olivaceous, brownish on pileum; throat, breast and under tail-coverts lemon yellow; sides of breast grayish olive; facial black restricted, narrow on forehead; outer primary shorter than the 6th; wing, 50–54 mm.; tail, 48–52 mm.; culmen, 9–10 mm.; tarsus, 21–23 mm.

Adult ♀: Smaller than ♂, relatively stouter bill; yellow of throat paler, restricted, sometimes absent.

Geothlypis trichas roscoe. SOUTHERN YELLOW-THROAT.

Sylvia roscoe AUDUBON, Orn. Biog. I, 1831, 124, xxix. Type locality, Mississippi.

Geothlypis trichas roscoe HASBROUCK, Auk, VI, 1889, 167.

Geothlypis trichas ignota CHAPMAN, Auk, VII, 1890, 11. Type locality, Tarpon Springs, Florida.

Adult ♂ : Large, brownish above; breast strongly tinged with ochraceous; under tail-coverts ochraceous yellow; facial black broad, especially on forehead; outer primary shorter than the 8th; wing, 53–55 mm.; tail, 50–54 mm.; culmen, 10–12 mm.; tarsus, 21–22 mm.

Adult ♀ : Smaller, slightly larger bill, less strongly colored.

Geothlypis trichas brachidactyla. NORTHERN YELLOW-THROAT.

Trichas brachidactylus SWINSON,[1] Animals in Menagerie, Jan. 1, 1838, 295. Type locality, "Northern provinces of the United States."

Adult ♂ in summer: Similar to *trichas* but larger, with stouter bill and longer and more pointed wings; outer primary longer than the 6th; wing, 51–57 mm.; tail, 48–51 mm.; culmen, 11–12 mm.; tarsus 19–21 mm.

Adult ♀ : Similar to ♀ *trichas* but larger, with more pointed wing and longer outer primary.

Geothlypis trichas occidentalis. WESTERN YELLOW-THROAT.

Geothlypis trichas occidentalis BREWSTER, Bull. Nutt. Orn. C. 1883, 159.

Adult ♂ in summer : Largest; above pale olivaceous; throat, breast and under tail-coverts bright lemon yellow; facial black with a broad whitish crown band; forehead black, narrow; outer primary longer than the 6th; wing, 54–61; tail, 53–56; culmen, 10–11; tarsus, 19–21.

Adult ♀ : Smaller; less richly colored, especially on the throat and breast; sides of face pale grayish, pale eyering, grayish tinge across breast.

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[1] "47. *Trichas brachidactylus.*

"Above, olive green; beneath, yellow: a black fillet enveloping the front, eyes, and ears, bordered above by cinereous white. Lateral toes nearly equal, and shorter than the hinder one.

"Inhabits plentifully, the Northern provinces of the United States."

Geothlypis trichas melanops. MEXICAN YELLOW-THROAT.

Geothlypis melanops BAIRD, Review Am. Birds, Smithsonian Miss. Colls. (181), 1865, 222. Type locality, Jalapa, Mexico.

Adult ♂, in summer: Large; above yellow olivaceous; beneath uniform rich yellow, ochraceous on the flanks; facial black with a broad whitish crown band, posteriorly margined with yellow; tail as long as or longer than the wing; wing, 62 mm.; tail, 61.5 mm.; exposed culmen, 12 mm.; tarsus, 22 mm. (type).

Adult ♀: Less strongly colored than the ♂; lores less ashy white; face and underbody pale yellow, whiter on the abdomen; sides of neck and breast pale reddish brown.

Distribution in Summer.

Florida and the seaward edge of the Coastal Plain from Chesapeake Bay into Texas; inhabits the cypress, cane and palmetto regions. Floridian . . . . . *roscoe.*

The Coastal Plain and Piedmont Plateau regions from southern New England to Chesapeake Bay, thence including the bases of the mountains into Georgia and the Mississippi Valley from near sea level to about 1000 feet. Carolinian . . . . . *trichas.*

New England, northward and eastward into Newfoundland, and near Hudson Bay. Transition and Canadian . . . *brachidactyla.*

Western United States from about the 97th meridian to the Pacific, and from northern Mexico into British America. Generally between 2000 and 6000 feet. Sonoran and transition . . . . *occidentalis.*

Eastern Mexico, probably below the eastern edge of the plateau. *melanops.*

Distribution in Winter.

Practically resident, except at its more northern habitat . . *roscoe.*

Southern Atlantic slope birds, wintering largely if not entirely in the southern States; the more northern and the intermediates migrating to the Bahamas and the West Indies; the Mississippi Valley birds into Mexico and Central America . . . . . *trichas.*

Along the Atlantic coast through the Bahamas to the West Indies, and perhaps further . . . . . *brachidactyla.*

California and southern tier of States into Central America and Lower California . . . . . *occidentalis.*

Into southern Mexico . . . . . *melanops.*

Comparative Areas of the Habitats.

The following figures are only approximate, but are well within the truth. They illustrate only the breeding range of the respective forms.

East of the Appalachians, 1000 × 150 miles = 150,000 square miles, plus Mississippi Valley area, 800 × 700 miles = 560,000 square miles. Total, 710,000 square miles. General elevation, 50 to 1000 feet. . *trichas.*

A coastwise strip about 2,000 × 25 miles = 50,000 square miles. General elevation, less than 50 feet . . . . . *roscoe.*

Practically an area 600 × 500 miles = 300,000 square miles. General elevation, northern sea level to 1,000 feet . . . *brachidactyla.*

An area 1200 × 1200 miles = 1,440,000 square miles. General elevation, almost entirely above 2,000 feet . . . . . *occidentalis.*

Area and elevation not known . . . . . *melanops.*

The areas here given total 2,500,000 out of the 3,500,000 square miles of southern British America and the United States. Contrasted with this immense area, with but four forms of *trichas* and four other species, we have in Central America, with but 950,000 square miles, at least 17 forms; an instance of the greater wealth of a tropical habitat.

The extension of the range of *roscoe* to Chesapeake Bay is based on my collection of the bird (June 1896–7–9) in the Dismal Swamp, where it is quite abundant in the cane (*Arundinaria tecta* and *macrosperma*) and the cypress (*Taxodium distichum*). In 1898 Mr. R. G. Paine, at my request, sought for Yellow-throats in the vicinity of Charleston, South Carolina. He found two, and took a specimen on November 1 in St. Andrew's Parish. It is an immature *roscoe.* Wilson has the following to say, undoubtedly of this bird:[1] "I found several of them round Wilmington, North Carolina, in the month of January [1809] along the margin of the river, and by the cypress swamp on the opposite side." It is doubtful if this form occurs far from the coast, certainly not above the 100-foot contour.

A specimen is in the Biological Survey collection taken by Wm.

[1] Am. Orn., II, 1810, 163.

Lloyd on East Caranchus Creek, Jackson County, Texas, Jan. 6, 1892. Another is in the National Museum collection taken by Dr. Shufeldt at New Orleans Nov. 26, 1882 (No. 90665). Audubon's specimen was taken in a deep cypress swamp in September, 1821, "not far from the river Mississippi, in the State bearing the same name."

Comparative Ecological Values of the Habitats.

Large amount of sunshine, great radiation, temperate climate and vegetation, perfect and rapid drainage, open and generally dry soil conditions, low to medium elevation, short to fair migration . *trichas.*

Fair amount of sunshine but tempered by insular characteristics, copious moisture, slow radiation, subtropical climate and vegetation, deep shade, slow drainage, low elevation, practically no migration. *roscoe.*

Fair amount of sunshine tempered by sea and boreal characteristics, slow radiation, subboreal climate and vegetation, good drainage, generally damp soil conditions, low elevation, extensive migration into a tropical climate . . . . . *brachidactyla.*

Excessive sunshine tempered by altitudinal characteristics, excessive quick radiation, partial desert climate and vegetation, generally poor and arid soil conditions, high elevation, fair migration into subtropical climate. . . . . *occidentalis.*

Subtropical habitat, otherwise unknown . . . . *melanops.*

Nomenclature.

As the first form of this species to be described binomially was the Maryland bird it becomes the type from which to differentiate others. The northern bird has not heretofore been separated except by Swainson, who evidently considered it distinct from the Maryland bird, for which he had substituted the name *Trichas personatus.*[1]

Mr. C. J. Maynard has described a specimen taken on February 2, 1884, at Nassau, New Providence Island, Bahamas, as a

[1] Zool. Journ. III. 1827, 167.

new species.[1] I have, through the kindness of Mr. G. S. Miller, Jr., to whom it belongs, examined the type. It is a midwinter immature *trichas-brachidactyla*, more nearly the latter, and probably from about New Jersey, Mr. Maynard's familiarity with the large New England bird and non-familiarity with the small Maryland bird, causing him not unnaturally to describe the stranger as new. (See Bonhote, Ibis, 1899, p. 510.)

I have accepted Audubon's name for the southern bird. There can be no question as to the Florida bird occurring along the Gulf coast, and therefore his bird, readily distinguishable when collected, though afterwards placed with *trichas*, should be given proper rank. As the bird was taken in a cypress swamp it renders this view more probable. The mistake of Dr. Hasbrouck occurred through assuming that a lowland resident Florida bird should also occur far up the Mississippi valley unchanged.

Mr. Oberholser's *arizela*[2] is based on extremely slight characters, but chiefly on 'geographical reasoning.' In the lowlands of the west occur smaller individuals than are to be found at higher altitudes close by. The birds of the Great Plains are intermediate in size between *occidentalis* and *trichas*, as are also more northern individuals. It is altitude that fixes the greater size of the large specimens of *occidentalis*, a fact evidenced by many other species. Wearing changes the coloration of the feathering in these birds to such a great extent that it seems unfortunate to base color values on summer specimens which acquired their plumage early in the previous autumn. The type of *arizela* is unfortunately an old and badly made skin. The greater yellowness, both above and below, of lowland and more southern California specimens is due to an approach toward influences which have produced *beldingi* and *melanops*.

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[1] "LITTLE BAHAMA YELLOW THROAT. *Geothlypis restricta.* — Above, dark olive green with space next to black abruptly ashy, mark restricted on the cheeks to about the same width as on the forehead, beneath, light yellow becoming lighter on abdomen and brownish on sides; wings shorter and rounder than in the common *trichas;* dimensions, wing, 2.40; bill, 23; tarsus, 25. Occurs in Bahamas." — *The American Exchange and Mart*, Feb. 5, 1887, 69.

[2] Auk, 1899, 257.

Differences.

The differences between typical specimens of the three eastern forms are quite strong. True *trichas* (Maryland) is a very small bird with a slender, short bill, restricted black facial area and pale colors in spring. It has a short, well-rounded wing in which there is little difference between the 3rd, 4th and 5th primaries, while the 1st is decidedly much shorter than the 6th. The formula[1] of length is usually 3–4–2–5–6–1–7–8, sometimes 4–3–5–2–6–1–7–8, rarely 4–5–3–2–6–1–7–8. In immature birds and in the most unworn spring specimens the formula is 4–3–5–2–6–7–1–8, the differences between the 1st and 7th being slight. The inner primaries wear faster than the outer, being weaker. Spring specimens taken about Washington, D. C., are always well worn and pale, contrasting strongly with the less worn and brighter specimens of *brachidactyla* taken at the same time and place. Nine spring males range in size: wings, 50–54 mm.; tails, 48.5–52 mm.; culmens, 9–10 mm.; tarsi, 21–23 mm. Ten females: wings, 47–51 mm.; tails, 46–48.5 mm.; culmens, 9.5–11 mm.; tarsi, 19–21 mm. The females sometimes lack entirely the yellow of the throat and breast which is never as extensive and as strong as in the other forms.

In its well rounded wing *roscoe* agrees with *trichas* but difference in length of the feathers makes a different formula. The 3rd, 4th and 5th are nearly equal, and a slightly wider interval separates the 2nd and 3rd, while the 1st is considerably shorter than the 2nd, as in *trichas*. But the inner primaries are longer, so that the formula is 4–5–3–2–6–7–8–1. Wearing takes place more rapidly on the inner primaries so as to result in the usual formula on worn individuals of 4–3–5–2–6–1–7–8. It is a much larger bird with a longer, stouter bill and tail, and a strong brownish tinge even in worn summer specimens. The wide forehead black and the ochraceous tinge of the yellow of the underparts are characteristic of this form. Thus *trichas* and *roscoe* agree well in the wing pattern but differ greatly in size and color.

[1] The outermost primary is here for convenience considered the first: the first number represents the longest feather, the last the shortest.

Dr. Shufeldt's New Orleans specimen, an adult male, is in fine unworn plumage and has much less ochraceous beneath than is usual in eastern specimens; it measures, wing, 56.5; tail, 55; culmen, 13; tarsus, 23. Its wing formula is 4–3–5–2–6–1–7–8.

Lloyd's Texas specimen is the palest example I have seen; its bill, though long, is rather slender, and though in good plumage it has much less brownish and ochraceous than in eastern specimens. It measures, wing, 55; tail, 56; culmen, 11.5; tarsus, 22.

Its tail is thus a trifle longer than the wing, the only instance in the species. The wing formula is 4–3–2–5–1–6–7–8.

An immature specimen from near Charleston, S. C., Nov. 1, 1898, in unworn condition, measures, wing, 55.5; tail, 52; culmen, 10.5; tarsus, 21. 5.

The northern bird resembles *trichas* in color, but comparable spring specimens are deeper and better colored, which is also the case with autumn specimens. Wearing produces similar effects as in the other form, so that summer specimens of both are quite similar except in size and wing outline. In *brachidactyla* we have a larger bird with a much stouter bill, longer wing and relatively shorter tail. The wing is less rounded, a greater interval separating the 4th and 5th primaries and a less interval the 2nd and 3rd, and the 1st and 2nd. This results in a longer outer primary and in its being next to the 5th in length, sometimes it follows the 4th. It is always longer than the 6th, not shorter as in the other forms. The formula is almost without exception 4–3–2–5–1–6–7–8. A variation is 4-3–5–2–1–6–7–8, another 3–4–5–2–6–1–7–8, but these are rare and are evidently due to wearing, occurring on spring specimens. Specimens taken in Virginia near Washington in spring measure, males, wings, 52–55; tails, 48–51; culmens, 11–12; tarsi, 20–21. Females, wings, 51–54; tails, 46–47.5; culmens, 11–11.5; tarsi, 17–18. In a series of Long Island May specimens the wings are 54–57; tails, 49.5–52.5. New England and Canada spring specimens are: wings, 55.5–57.5; tails, 49.5–53. Spring male specimens from the Bahamas: wings, 54–59; tails, 50–55.5. A series from the mountains of western Pennsylvania in summer: wings, 48–57.5; tails, 44–52. The largest *trichas* that I have seen from about Washington has a wing of 54, while the average is much less. A series of New York city autumnal

males give, wings, 54–59; females, wings, 53–56.5. These and numerous others show that the size increases northwards, also the length of the outer primary. In Pennsylvania in the same latitude, different sized birds are found on opposite sides of the mountain divide, the larger, curiously enough, occurring at a generally lower elevation on the western side. The cause is explained under migration. The females of all the forms are smaller than the males of its subspecies and, except in *brachidactyla* and *occidentalis*, have relatively stouter bills.

The western bird, *occidentalis*, is a little larger than *brachidactyla*, but grayer in dorsal coloration with a broad white posterior edging of the facial black. The yellow of the throat is more intense and the black of the forehead is relatively narrower. Freshly molted adult birds are but slightly paler dorsally than eastern birds, but immature birds are fully as dark and as brown above as in similar aged eastern birds. The females in summer are as a rule less yellowish and paler than eastern birds. A few have decidedly yellow throats but it is far from the rule. The immature females are browner and duller above and beneath with a much browner tinge across the breast than in either *trichas* or *brachidactyla*. As a rule the 4th primary is slightly the longest, but wearing in many cases soon makes the 3rd the longest, and sometimes the 3rd is the longest in immature birds. The wing formula is usually 4–3–2–5–1–6–7–8; rarely the 6th is longer than the 1st, and sometimes the 5th is slightly longer than the 2nd; wearing reduces the inner primaries so that the formula becomes 3–4–2–5–6–1–7–8 or 3–4–2–5–1–6–7–8.

Melanops differs from the other forms in having a yellow border to the ashy crown band,[1] an indication of the more tropical forms *beldingi*, *flaviceps* and *flavovelata*. The type is the only one that I have seen. It is in partially worn plumage, the yellow bordering the crown band being almost completely obscured by brown tips to the feathers. If the tail was unworn it would undoubtedly exceed the wing in length. This bird differs from *occidentalis* by its shorter outer primaries, longer and larger tail and feet, and the

[1] All the *trichas* group have a trace of yellow back of the ear-coverts in many specimens, but in this form the yellow is well developed.

more extensive yellow of the underparts and dorsum. The type has a wing formula of 4–3–5–2–6–1–7–8, with the widest space between the 5th and 6th. The 6th is of course more worn.

Except in *formosa* the females of all the forms are quite different from the males in coloration. The presence of an interrupted eyering in the females of the *trichas* group is also found in the males of some of the *agilis* and *poliocephala* groups, an evidence of their incomplete or imperfect evolution. This eyering is absent or slight in the more tropical forms. Its occurrence in young males indicates a step in their evolutional change from the ancestral form.

In *melanops* we have an approach to the Mexican and Central American species in which the ashy crown band is absent and replaced by a yellow band or by the green of the dorsum. It is truly an intermediate between the highly specialized *trichas* type and the lower but more brilliant *subflava* type, the transition occurring on the one hand through *flavovelata* and *bairdi* and on the other through *occidentalis* and perhaps *roscoe*. *Beldingi* is another extreme of the *flavovelata* and *flaviceps* type.

The differences here presented are zoögeographical. As the food of males and females is probably similar we have no clue there to the causes that have brought about such a contrast between the sexes. Why then have they differed and why in *formosa* are they so alike? *Formosa* differs from the others in the character of the songs of the males. It is a simple warble, not the outpouring burst of the *trichas* type. The vivacity and more active life of the males of this last species and their great song powers have seemingly led to an accentuation of pigment on the forward part of the body. It would seem that there is some element in their food taken in the damp shady retreats of their habitats which in combination with their active, songful life has permitted this accentuation of pigment. Natural selection by permitting, as a rule, the most striking and hence the most active and enduring, to propagate, not by any selective ability of the females, but by the greater vigor and persistence of the males, has slowly evolved the strong characters of the males. Boreal influences and a long migration have prevented the *agilis* group from progressing to the same extent as in *trichas*.

The northern birds have short secondaries while the non-migratory and especially the lowland birds have long secondaries.

Causes of the Differences.

Freshly molted autumnal specimens of the four United States forms are not greatly unlike in color, but *roscoe* is the richest and deepest colored. These richer and browner colors are evidently due to its moisture, lowland, semi-tropical habitat, while its size and well-rounded wing are evidence of its non-migratory habit, its practically insular home and abundant and easily obtained food. It is a rather shy, retiring bird not easily coaxed from its leafy retreats. It inhabits a region of the least relative radiation and is not a sun-loving bird.

The smaller, paler *trichas* is at home in summer about the marshes and low places of the Coastal Plain and Piedmont Plateau, where it is exposed to more sunlight, less rich and generally drier conditions. The shortness of its migration accounts for its similarity in wing contour to *roscoe*. It inhabits a region of great relative radiation of heat and moisture, rendered stronger by the effects of civilization upon forest growths, the bird having undoubtedly greatly extended its range as the country became deforested, as for instance in the mountains of Pennsylvania up to 3000 feet. It greatly enjoys sunlight. In winter it seeks as nearly as possible similar conditions. Its very close relative, too near perhaps to be subspecifically separated, the Mississippi Valley bird, is, in comparable specimens, more highly colored and often larger. It inhabits a moister and richer region and its winter residence in Mexico and Central America causes a longer migration, hence its longer wing and greater size. The usually greater extent of yellow on the under body as compared with eastern specimens shows less wearing and consequently the less harsh character of both its winter and summer habitats. Specimens of *trichas* that I took in Chotank Creek marsh, King George County, Virginia, in July, 1898, had the yellow of the throat extending to a point down the centre of the under body, while the sides are even more worn than in ordinary birds.

This was caused by the bird's habit of perching on the long inclining leaves of wire-grass abundant in the marsh, bushes and twigs being uncommon. Alternate contact of the sides of the body with the grass wears the yellow tips of the feathers leaving the centre of the body almost untouched. The constant perching of most individuals of *trichas* and *brachidactyla* on generally horizontal twigs produces the same effect but evenly up to the breast. The Mississippi Valley birds, owing to the less harsh character of the vegetation mainly of the winter habitat, have in comparable specimens less of the yellow worn off than occurs in eastern birds. Some examples are, however, identical in wearing with these two preceding forms.

The more boreal habitat of *brachidactyla* and its consequently much longer migration accounts for its greater size, its longer wing and longer outer primary. The relatively less radiating power of its northern home, with a diminished amount of sunlight, has also assisted, besides the more tropical character of its winter home. Spring and summer specimens from the southern portion of its range are paler and more bleached than in more northern examples of even date. The more northern birds are also more shy and more difficult to secure.

In *occidentalis* the 4th primary is often longer than the next on either side, the 3rd, 2d and 1st graduating quite evenly in a manner not seen in true *trichas*. In the Mississippi Valley a less pronounced similarity is evident on birds from the western portion of the valley; but to the northeastward the outward primaries become longer and the wing contour merges into the typical of *brachidactyla*. The great elevation of the habitat of *occidentalis*, from 2000 feet up, has produced its greater size. Its practically short migration permits it to retain the ancestral wing contour; but in the more northern birds and those of the Plains the 3rd primary is often the longest, and the wings are slightly more pointed.

In *melanops* we have a richer colored and yellower bird, due undoubtedly to its more tropical habitat, as shown in all the southern forms. Food is of course the prime factor in determining the amount and character of the pigment of these feathers, but we have little evidence as to its precise relation to color values.

The longer tails of the most southern specimens of *roscoe*, and of *melanops*, point to a sub-tropical and almost sedentary life; while the shorter tails and longer wings of far northern birds show results due to migration.

Intergrades.

The first Yellow-throats to appear about Washington in the spring migration are true *trichas*, later larger birds appear, the latest migrants being *brachidactyla*. During August *trichas*, both adult and young, move southward and gradually are replaced by larger birds, so that by September 1 the summer residents have wholly disappeared and a larger intermediate lot of birds are abundant, especially about the marshes. These are followed during the month by still larger birds with longer wings and longer outer primaries, so that October specimens are almost always typical *brachidactyla*. The proportion of good *brachidactyla* is much less than of *trichas* or of intermediates, as the latter loiter on the southward journey, while the former with a much longer journey in view make fewer stops. Their main bulk, however, journey coastwise. Specimens from the vicinity of New York and Long Island, while not perfectly typical *brachidactyla*, are constantly so different from typical *trichas* as to be placed with the former.

About Washington true *trichas* frequents the roadsides, the marshes and small low bushy places on the hillsides. The intermediates almost entirely frequent the marshes, while the larger *brachidactyla* nearly always is found in ravines and along streams in the deep woods.

The Mississippi Valley bird really is an intermediate, nearer *trichas* in the middle and eastern areas of the valley, nearer *brachidactyla* northward and northeastward, while along the eastern edge of the plains it merges into *occidentalis;* this result having been most evidently produced by the gradual disappearance of the Mississippi Sea.

The birds of the Dismal Swamp are not quite typical *roscoe*, but decidedly are not *trichas*. The birds of Virginia Beach, east of Norfolk, are similar. On the opposite shores of Chesapeake

Bay only *trichas* is found. At Smith's Island the summer residents are rather large *trichas* and quite unlike those from Virginia Beach which is but 20 miles across the mouth of Chesapeake Bay. Intergradation must occur through the region about the mouth of the James River, in fact specimens from near Suffolk, just outside the Dismal Swamp, are less like *roscoe* than those in the swamp.

Occidentalis presents some variation in the direction of other forms. The birds of the great California and Rio Grande valleys are greener above and have the sides of the body more extensively yellow than in other examples. These lowland individuals trend in the direction of *melanops*.

The differences between *occidentalis* and *melanops* are blended in an adult male taken by Dr. E. A. Mearns at Fort Hancock, Texas, June 13, 1893, which is undoubtedly a geographical intergrade (No. 134393 U. S. N. M. Coll.). In this specimen the wing is 58 mm.; tail, 54 mm.; culmen, 11 mm.; tarsus, 22 mm.

There is much yellow mixed with the worn white crown band, and its appearance readily suggests both *occidentalis* and *melanops*

Variations.

"Individual variation" as usually understood and spoken of is simply a phrase to denote our ignorance of the precise relations of individuals to their environment, their ecology. It also generally covers differences of age. As I have shown, most of the differences in the species *trichas* are purely zoögeographical, a result of their peculiar and positive relation to their environment, both in summer and winter, in fact the various forms are products of their own peculiar environments. There is little true individual variation, that is, variation from the average in the same locality. A few specimens, here and there, of *trichas* have a wider and whiter area of ashy on the head. This is simply due to a wider absence of a maximum amount of pigment in the growing feather, caused probably by a local lesion or lapse of pigment (= equal food change) while the feathers were growing. Sometimes a male shows a lightening of the yellow of the throat, but such specimens are rare. More variation is noticeable in the females of *trichas*, less so in *brachidactyla*, a few being entirely destitute of

yellow, others having but a trace. A female from Smith's Island shows strongly the outline of the black and ashy of the male, especially on the forehead. In some immature fall male specimens the black and ashy is either greatly restricted or nearly obscured by brown tips to the feathers; in others the reverse is the case. The difference is doubtless caused by the former being from late broods, the latter from early ones. As a rule the personality of these birds is so strong that the environing influences are unable to allow variation except in geographical directions.

Migration.

The large but well rounded wing of *roscoe*, with its short outer primary, and its known winter distribution, shows that it practically is a resident where found. It evidently entirely withdraws from Virginia in winter, but occurs in that season as far north at least as the central coast district of North Carolina. The very similar wing contour of true *trichas* shows that its migratory journey is not extensive, probably few, if any, leaving the United States. The longer wing and longer outer primaries of the Mississippi Valley birds and their known winter home, shows that their journey is longer, which is also the case in a greater degree with the northern form *brachidactyla*. The following is interesting in this connection. A large series of summer specimens from the mountains of Western Pennsylvania were kindly placed at my disposal by Mr. W. E. Clyde Todd. Upon measuring them, it developed that they could readily be placed according to size in two groups, this being independent of altitude. Distributing these specimens on a map according to localities, it became apparent that the larger birds came from the most western portion of the State, the plateau region, while the group of smaller birds came from the mountains eastward of the divide. The drainage of the plateau is toward the Mississippi, while the mountain area is drained by streams which flow southeastward into the Susquehanna and then into Chesapeake Bay. It is apparent, therefore, that the small birds, almost typical *trichas*, reached their mountain summer home from the southeast by way of the river valleys, while the larger birds of the plateau came

from the southwestward and traveled a much greater distance in going to and from their winter habitat in Mexico and Central America. Thus birds of the same subspecies occurring in the same latitude at the same or a different elevation and in adjoining counties, are divisible into two groups according to size, the difference being due to the contrast in the length and direction of their migrations. This result is peculiar and interesting, and in line with the already known fact that many eastern Mississippi Valley migrants reach New York State, and pass even further east.

The eastern trend of the Atlantic coast line is an important factor in the migration of *brachidactyla*. Twenty-six spring specimens collected in the Bahamas by the naturalists of the U. S. Fish Commission Steamer 'Albatross' are true *brachidactyla*, though somewhat darkened and weathered. They undoubtedly were on their way to northern New England, Nova Scotia, or Newfoundland.

While on Smith's Island, Virginia, in May, 1898, I saw some three dozen Yellow-throats which, with other birds, had struck the lighthouse ten days previously. They all were *brachidactyla* and mostly males. Several struck the lighthouse on the evening of May 21, and I secured three females; they were the same form. The resident birds on the island, which are abundant and slightly larger than typical *trichas*, were all paired and breeding at the time.

Maryland Yellow-throats are frequently mentioned by writers as being abundant during migrations at lighthouses along the coast; they of course are *brachidactyla*. This and the occurrence of the form in abundance during migrations in the Bahamas readily suggests the idea that the migration course is almost if not entirely southward in the autumn; that birds bred in New England and eastward migrate toward the coast and thence over the sea through the Bahamas to the West Indies.

This suggests the probability of a former narrower separation of the islands from the continent.

The birds of the Mississippi drainage area are larger as we go northward but do not attain the pointed wing and long outer primary characteristic of typical *brachidactyla*. The western bird,

occidentalis, migrates comparatively little except along its northern habitat. The birds which summer at a high altitude evidently simply descend to lower stations along our southern borders, where they spend the winter in favorable situations. Migration evidently has little effect on their feather growth, their size being due to the generally high elevation of the summer habitat, a truth shown in many other species.

Little is known of the movements of *melanops*, but there would seem to be little difference from *occidentalis*; its richer coloration implies a more southern and less boreal habitat.

The effects of a long migration are well shown in other species of *Geothlypis* in North America.

In *G. agilis*, the most northern breeder and probably also the most southern in its winter habitat, we have the largest form, and the outer primary (on immature birds the 2nd) is the longest, the others graduating to the innermost. In *G. philadelpha* and *G. tolmiei*, more southern yet high ground breeders, the wing is slightly more rounded, the 3rd, sometimes the 2nd, being the longest; the bill is smaller than in *agilis* and the bird is smaller.

In *G. formosa* there is little difference in the lengths of the three outer primaries; but the outermost is always slightly the shorter, the longer being usually the 2nd. Their migration is less extensive than those given above.

As the more southern and therefore more tropical forms do not migrate extensively we find in consequence a more rounded wing with short outer primaries, the fourth (often the third when the feathers are worn) being the longest. It seems evident then that the comparative lengths of the wings, and especially of the outer primaries and the secondaries, are an index of the comparative length or absence of migration in the respective forms. The comparative differences of size, length of wing, primaries and tails are in this genus simply effects of latitudinal and altitudinal habitats modified when necessary by insular characteristics, or length, character, or absence of migration, hence more of subspecific or specific than of generic or subgeneric values. According to this view a genus *Oporonis* does not exist.

The Molt of the Adult.

In the new autumnal plumage all of the *trichas* group are distinguished by a richness that they do not possess in spring. The dorsum is decidedly brownish, and the ashy of the head is obscured by brown tips, the black by ashy and brown. These tips wear off during the autumn and winter and much of the brownish also, so that the width of the ashy and black areas are increased and the color intensified by wearing. The dorsal brown is worn off, slightly in *roscoe*, much more in *brachidactyla*, and usually almost entirely in *trichas*. A few spring *trichas* retain this brown to some extent on the pileum. There is a spring molt of the throat feathers, also of the facial black, but this last may not be complete. The fall molt takes place while the birds are moving slowly southward; the spring molt evidently occurs before they start northwards. The female does not molt in spring.

The Molt of the Immature.

As soon as the young is capable of obtaining its own food, it begins to change its nestling (mesoptile) plumage. This is effected rather slowly. First a few yellow feathers appear on the sides of the breast and then on the sides of the throat. Green feathers next appear on the back and scapulars, the body being first covered with the new feathers. In the male blackish feathers then appear under the eyes back of the gape, and brownish feathers on the top of the head, thence the change rapidly continues, the tertials, wing- and tail-coverts changing while the head changes. When the birds complete this stage they start on their southward journey (at least about Washington), so that it is difficult to follow further changes, but there is no doubt that the change continues and includes the wings and tail. No. 3203, August 14, 1893, W. P. collection, is an immature male *trichas* that has nearly completed the molt; the four outer primaries are of various lengths of growth, the inner all having been changed. This is similar to the change in the adults and at once shows how

the length and character of the migration can influence the growth of these feathers, greater wing power having developed and found expression in longer outer primaries as the length of the migration journey gradually increased in the individuals subject to the change. The three outer tail-feathers of this specimen on one side, four on the other, are still in place, but the central ones have dropped out and new ones are growing. A female, No. 3503, August 10, 1894, is in somewhat similar condition, the outer primaries are further advanced and the outer new tail-feathers are of differing lengths. The body change is nearly complete. Other specimens show similar changes, commencing about the middle of July and completed by the middle of August. This molting takes place all along the Atlantic watershed about the same time, but the birds of any given locality move further south before it is completed. It would seem that the night flights begin when the wing molt is fully completed.

A spring molt undoubtedly occurs, especially in the males, but it is confined to the face and throat. The yellow of the throat and most if not all of the immature facial black and the white eyering is replaced, so that the immature spring bird is hardly distinguishable from an adult. No spring molt appears evident on female specimens. Occasionally a male specimen is taken in spring which has not had a spring molt. I have taken several about Washington and have seen others. Immature birds of all the forms have slightly shorter wings and primaries during their second summer.

The high and arid character of the habitat of *occidentalis* accounts for the paleness of spring, summer, and most winter specimens, but the darkness of freshly molted birds tells a different tale. As already stated, the immature when freshly molted are as dark as eastern birds and the adults are scarcely less so. But a paling of the plumage rapidly takes place, being entirely caused by the bleaching action of the dry, clear, western atmosphere. The white feathers bordering the facial black are at first ashy, but little paler than in eastern birds, but they soon bleach even before they have fully grown, except where, as in immature birds, they are protected by brownish tips. This darker coloration of freshly molted birds is an index of the char-

acter of the local habitat. These birds inhabit bushy moist situations, where they obtain their food near or on the ground, so that it is not remarkable that the effects of a generally prevailing arid climate should counteract purely local pigment effects. Thus paleness in this bird is largely a mechanical effect due to climate and wearing. There is a constant struggle between the effects of a local, rich, moist land diet, which alone produces the pigment, and the high and generally arid climate which has many months in which to effect a bleaching change.

CONCLUSIONS.

The evidence shows that the Yellow-throats of the Eastern States can be readily segregated into three well marked subspecies, each occupying topographically, geologically and climatologically distinct faunal areas of enormous extent, and that each one is the product of its own peculiar environment plus in one case the effects of a long migration. The comparatively recent, geologically speaking, retreat of the glacial snow and ice has permitted, slowly to be sure but steadily, the evolution of *brachidactyla* from its preglacial short-winged ancestor. This has been effected not by the extension of the range of a species or even a subspecies but by the slow increase of the more northern individuals as the retreating snow and ice opened up a greater extent northward of possible breeding range. Concomitant with this increase of individuals in one direction occurred also a change of structure and character, the change being in an ascending ratio as a more northern point was reached each year or cycle of years. The result was a constantly increasing difference, the birth of a subspecies. Therefore, like so many other North American birds, *brachidactyla* is a result of a decrease of glacial ice and snow. We have then along approximately the same longitude three distinct forms of one species with two sets of intermediates. At one end the form is large because the individuals obey the well known law, that: *where a species occupies a longitudinal or altitudinal range the more boreal individuals are larger than their relatives of adjoining lower ground habitat.*

At the southern end the form is also a large one because the individuals obey the law, that: *where a species occupies a range one end of which is a low, tropical or island area, then the individuals occupying this portion are larger than those occupying an adjoining dissimilar habitat.* The result may be a species or subspecies differing from the parent stock according as the separation is long, or the environing influences are intense or weak. In the case of *brachidactyla* migration has intensified the divergence by compelling a longer wing, a process still in progress. The lapse of time since the glacial retreat has not been sufficient to make the outer quill the longest but such is evidently the tendency. In *agilis* we have a species which evidently occupies largely what was an island area in preglacial or interglacial times, and the development of the wing was hastened by the birds having to migrate over, or by, a Mississippi Sea.[1] In *tolmiei* and *philadelphia* we have two slightly differing species, evidently two divergents from a common stock; divergent because they extended their range northward on opposite sides of the Mississippi Sea. It would seem also that in *trichas* and all its eastern relatives we have one branch, and in *melanops* and *occidentalis* another, long separated by the same cause. The retreat of the ice has permitted the forms to be localized where we now know them, and as the Mississippi Sea disappeared *trichas* and *occidentalis* approached each other and have apparently insensibly intergraded. A similar case is the Meadowlarks which have joined habitats during the historical period.

It will have been noticed that the ranges of the three forms of *trichas* on the Atlantic slope are quite peculiar. Considered latitudinally the range of *roscoe* ends where *trichas* is in its prime, and in its turn this gives way to *brachidactyla*. The reason is evident, they occupy different faunal areas, the characteristics of which are determined by altitude, the slope angle and the character of the drainage. The width of the faunal area and the char-

[1] The former presence of this sea is indisputable and its effects on the distribution of North American bird life have hardly been noticed, yet it divided it into two parts, usually with representatives on each side. The life of the parts have approached each other as the sea disappeared and at the same time southern forms have moved northward.

acter of the topography, geology and vegetation are important factors. The Mississippi Valley bird is like true *trichas* because it occupies similar altitudinal and geological territory; it is unlike *trichas* mainly because its winter habitat is different and is at a greater distance. The latter influence is the slightest and permits us to retain the bird in the same subspecies, but further northwards and especially northeastwards, the other influence becomes stronger and a different subspecies is the result. The best examples of *brachidactyla* are from the Atlantic coast, because there the birds make a sea journey and evidently specialized quicker because of their comparatively narrow habitat during the glacial retreat; the broader area of the Mississippi region and the lake barriers having delayed the development of the birds northward. The migration of *brachidactyla* through the Bahamas proves that this group of islands was formerly less widely separated from the continent.

In my study of these birds, I have been unable to consider temperature as an important factor in producing differential characters. The strong psychological characters cannot be accepted as caused by temperature, for they are almost entirely absent in the females. The physiological characters are necessarily to be correlated with other more direct influences, many of which I have indicated. One effect of temperature has been to permit of a larger number of forms in the tropics, but only indirectly by its influence on other life and in connection with other causes in affecting the topography. Northward few species are found, but they are strikingly different even in the same temperature areas. Temperature acts principally as a barrier in preventing, along the northern and higher borders of the ranges of these birds, favoring topographical conditions. If our present arctic zone was to disappear, these birds would gradually work northwards and eventually, if favorable conditions continued for a long period, would break up into various forms under the influence of local conditions; but they would never have the short rounded wings of their tropical relatives unless their migration should wholly cease.

The genus *Geothlypis* is purely Nearctic wherever it is found, and undoubtedly developed in North America during preglacial

times. Its presence south of the United States is due to former glacial influences, and it is evident that such forms are the lowest and most generalized. The *trichas* group represents its highest development.

I would extend the present accepted southern limit of the Nearctic subregion to include nearly all of the West Indies, Central and South America, and consider its life as an invasion and overlaying of the Neotropical region consequent upon the effects of a glacial period. Neotropical life now barely reaches the United States. Present winter North American life represents a transition between the original Palæarctic, from which it has been derived, and the pure Nearctic, an earlier result, of which *Geothlypis* is an example.

My indebtedness to the collections of the National Museum and the Biological Survey is gratefully acknowledged.

NOTES ON A FEW SPECIES OF IDAHO AND WASHINGTON BIRDS.

BY JOHN O. SNYDER.

DURING the year 1894 the following notes were made in northern Idaho and Washington. Specimens of each species mentioned were taken and preserved. The localities visited were Kaniksu Lake, Blue Lake, Hoodoo Lake, and Spirit Lake in Kootenai Co., Idaho; Diamond Lake in Stevens Co., Mt. Carleton in Spokane Co., and Pullman in Whitman Co., Washington.

1. **Merganser americanus.** AMERICAN MERGANSER. — Several females with young observed at Diamond Lake, where downy young were taken, June 21.

2. **Anas boschas.** MALLARD. — Very common in Hoodoo Valley during August, when females with large flocks of young were frequently seen. No males were taken. Also seen at Lake Kaniksu.

3. **Aythya americana.** REDHEAD. — Lake Kaniksu and Hoodoo Valley. Young were seen at the latter place, Aug. 18.

4. **Branta canadensis.** CANADA GOOSE. — One flock, from which three specimens were taken, was seen near Kaniksu Lake, July 26.

5. **Porzana carolina.** SORA. — Common at Hoodoo Lake and the adjacent marshes where the downy young were taken Aug. 13.

6. **Fulica americana.** AMERICAN COOT. — Very abundant at Hoodoo Lake, where on Aug. 13, young measuring from 243 to 282 mm. long were taken.

7. **Gallinago delicata.** WILSON'S SNIPE. — Two specimens were collected near Pullman, Jan. 21, when the ground was covered with snow. Specimens were also taken at Blue Lake.

8. **Ægialitis vocifera.** KILLDEER. — Common at Pullman. Observed in the spring as early as March 1.

9. **Dendragapus obscurus richardsonii.** RICHARDSON'S GROUSE. — Commonly known as 'Blue Grouse.' They were abundant in the vicinity of Blue Lake from the 12th until the 30th of July. During this time the females and young were migrating from higher altitudes. They were abundant on the foothills east of Hoodoo Valley during the latter part of August. None were seen in the lower parts of the valley. No males were observed.

The small young have a pointed tail of three or four feathers with white shaftlines. Later, when the more permanent feathers grow out, the tail consists of a dark colored, square cut basal part, beyond which the lighter feathers project. When the dark feathers have grown to be as long as the lighter ones the latter are shed.

When disturbed, the mother and young usually took to the nearest trees and quietly observed the intruder. Both old and young were very tame, and while foraging they frequently came into camp. Once, on looking up from my work, I saw a female quietly walking out of my tent, while her five young were searching for food near by.

10. **Canachites franklinii.** FRANKLIN'S GROUSE. — Although not a common bird, the 'Fool-hen' was sometimes seen in the forests of black pine near the Pend d'Oreille River. One sat sedately on a limb while a revolver was emptied at her. The shots having missed, roots and stones were thrown, which she avoided by stiff bows or occasional steps to the side.

11. **Bonasa umbellus togata.** CANADIAN RUFFED GROUSE. — Females and downy young were observed at Diamond Lake, June 13 and 23.

During the early part of July, young were frequently seen in the vicinity of Mt. Carleton. No males were observed.

In August, individuals of this species were commonly seen in the valley of Hoodoo Lake.

12. **Zenaidura macroura.** MOURNING DOVE. — Vicinity of Pullman, during September.

13. **Buteo borealis calurus.** WESTERN REDTAIL. — One was secured at Blue Lake, and another, a young individual, near the Pend d'Oreille River.

14. **Aquila chrysaëtos.** GOLDEN EAGLE. — Kaniksu and Blue Lakes. Not common.

15. **Falco columbarius.** PIGEON HAWK. — Pullman, Washington, October; Hoodoo Valley, August.

16. **Falco sparverius.** AMERICAN SPARROW HAWK. — Sparrow Hawks were common in Hoodoo Valley during the latter part of August.

17. **Pandion haliaëtus carolinensis.** AMERICAN OSPREY. — Pullman, Wash., May 1. Fish Hawks were frequently seen at all the lakes visited. Sometimes they caught fish so large that they could scarcely manage them.

18. **Asio wilsonianus.** LONG-EARED OWL. — One female taken in Hoodoo Valley, Aug. 18.

19. **Asio accipitrinus.** SHORT-EARED OWL. — Found breeding at Pullman, Wash., May 5, and later. The nests, on the ground, are often plowed under by ranchers.

20. **Speotyto cunicularia hypogæa.** BURROWING OWL. — Occasionally seen in the vicinity of Pullman. Nests in burrows of *Spermophilus.*

21. **Ceryle alcyon.** BELTED KINGFISHER. — Diamond Lake and Blue Lake. Not common.

22. **Dryobates villosus harrisii.** HARRIS'S WOODPECKER. — One young individual taken in Hoodoo Valley.

23. **Sphyrapicus varius nuchalis.** RED-NAPED SAPSUCKER. — Common in the vicinity of Diamond Lake.

24. **Colaptes cafer.** RED-SHAFTED FLICKER. — Pullman. From March to September. Not common.

25. **Chordeiles virginianus.** NIGHTHAWK. — Abundant at Diamond Lake and at all points visited in Idaho. Downy young were found at Blue Lake, July 20.

26. **Trochilus alexandri.** BLACK-CHINNED HUMMINGBIRD. — One female taken at Blue Lake, July 10. Not common.

27. **Selasphorus rufus.** RUFUS HUMMINGBIRD. — One male and a nest containing two young were observed at Blue Lake, July 17.

28. **Otocoris alpestris arenicola** (sub. sp.?). DESERT HORNED LARK. — Common at Pullman. They were observed in flocks with *Anthus,* Oct. 21. Abundant in March and April. Nestlings seen Apr. 25.

29. **Pica pica hudsonica.** AMERICAN MAGPIE. — Hoodoo Lake, Aug. 16. Common in winter.

30. **Cyanocitta stelleri annectens.** BLACK-HEADED JAY. — At high altitudes near Blue Lake. Not common.

31. **Sturnella neglecta.** WESTERN MEADOWLARK. — Common at Pullman. Abundant during September, March and April. Not seen in winter.

32. **Poœcetes gramineus confinis.** WESTERN VESPER SPARROW. — Pullman. Numerous small flocks seen in September and April.

33. **Zonotrichia leucophrys intermedia.** INTERMEDIATE SPARROW. — Pullman; common in April.

34. **Spizella monticola ochracea.** WESTERN TREE SPARROW. — Pullman; common during April. They frequent the thickets bordering the creeks, where the first ones were taken, March 3. The ground was covered with snow at that time.

35. **Junco hyemalis connectens** *Coues.* — A Junco which I identify as above, possibly incorrectly, was common everywhere. Pullman, Mar. 31. Nesting in the vicinity of Mt. Carleton, July 4. Young were seen at Blue Lake, July 18.

36. **Melospiza melodia montana.** MOUNTAIN SONG SPARROW. — Common in flocks with *Spizella monticola ochracea* in the vicinity of Pullman during the first week of March. Common on the low meadows bordering Blue Lake.

37. **Passerella iliaca schistacea.** SLATE-COLORED SPARROW. — Pullman. Usually seen perched on the topmost twig of some bush, singing vigorously.

38. **Piranga ludoviciana.** LOUISIANA TANAGER. — Frequently seen at Blue Lake.

39. **Ampelis cedrorum.** CEDAR WAXWING. — Small flocks of these birds were occasionally seen at Blue Lake.

40. **Geothlypis tolmiei.** MACGILLIVRAY'S WARBLER. — Near Mt. Carleton in open woods. A nest with eggs was seen, June 30.

41. **Anthus pensilvanicus.** AMERICAN PIPIT. — Abundant at Pullman during the latter part of October in flocks with *Otocoris.*

42. **Sitta canadensis.** RED-BREASTED NUTHATCH. — Blanchard Valley, on the east slope of Mt. Carleton.

43. **Regulus calendula.** RUBY-CROWNED KINGLET. — Pullman; common during April.

44. **Hylocichla ustulatus swainsonii.** OLIVE-BACKED THRUSH. — Common at Blue Lake during the latter part of July. Also observed in Hoodoo Valley.

45. **Merula migratoria propinqua.** WESTERN ROBIN. — Robins were seen in every locality visited. They were common in flocks at Pullman during September. In the Spring (March 3) they returned before the snow melted, and began nesting so early that the eggs and young birds were frequently frozen.

DESCRIPTION OF A NEW SHEARWATER FROM THE HAWAIIAN ISLANDS.

BY H. W. HENSHAW.

Puffinus newelli, sp. nov.

Above, including upper surface of wings and tail, clear and somewhat glossy black. Border of under wing-coverts black. Beneath, including under tail-coverts, pure white. Maxilla and edge and tip of mandible black; rest of maxilla light brown. Tarsus and feet light yellow, but black along the outer posterior side of tarsus, the outer toe and half the middle toe. Wing, 8.65; tail, 3.75; bill, 1.28; tarsus, 1.80.

The above is a description of a Shearwater obtained by Mr. M. Newell of Hilo (Brother Matthias of the Catholic Brotherhood) in Waihee Valley, Island of Ulani, in the spring of 1894, and by him recently presented to the author. The sex was not determined. The bird was taken from its burrow with several others by natives and brought to Mr. Newell alive. The latter saved two specimens. One, the type, is in my possession; the other is probably still extant and in Honolulu.

In 1894 the species was numerous enough in the above mentioned locality, but its present status is doubtful, for the mongoose, which is rapidly exterminating the native Puffins elsewhere upon the islands, is an inhabitant also of Ulani.

As this Puffin was quite unknown to me, and as no account of it appears in either Rothschild's or Wilson's works upon the island birds, I sent the specimen to Mr. Ridgway who kindly compared it with National Museum material. Mr. Ridgway's remarks upon the specimen are as follows: "The *Puffinus* which you sent for identification is without doubt a new species. It comes nearest to *P. auricularis* Townsend, of Clarion Island (Revillagigedo group, N. W. Mexico), but differs in blacker color of upper parts, wholly white malar region, more extensive, more uniform and more abruptly white anterior and central under tail-coverts, more extensive and 'solid' blackish border to under wing-covert region, and especially in the very abrupt line of demarkation along sides of neck between the black of upper parts and white of under

parts. *P. auricularis* also has the bill entirely black and also stouter."

The species is dedicated to Mr. Newell, who has paid considerable attention to Hawaiian birds and has made extensive collections.

NESTING HABITS OF THE PACIFIC COAST SPECIES OF THE GENUS *RUFFINUS*.

BY A. W. ANTHONY.

Plate VIII.

THE BLACK-VENTED SHEARWATER (*Puffinus opisthomelas*), the most abundant of our Pacific Shearwaters, is extremely plentiful off the coast of central California during the summer months, and is found at all seasons of the year south of the Santa Barbara Islands. How far north its range extends I am unable to say, but I have seen what I was reasonably sure was this species off the Columbia River in November. Since its summer range is so far to the north it is a little strange that no breeding grounds have been discovered north of the Mexican Boundary.

Several years since Major Bendire wrote me that there was in the National Museum two or three eggs said to have been taken on one of the Santa Barbara Islands. As I now remember, he expressed some doubt as to the location, but considered the identification correct. That it does not nest on any of the larger of the Santa Barbara group, I am certain, since the foxes that inhabit the islands would exterminate them, but it is possible that on some of the smaller islands where there are no enemies a few may be found nesting. South of the Santa Barbara Islands I am confident none are found until Guadaloupe is reached, about two hundred miles south of the National boundary.

Several years since, I found the Black-vented Shearwater (*Puffinus gavia*) rather common on Guadaloupe, where their burrows were dug under huge blocks of lava in several parts of the island, but in no place was there any large colony. Their nests

were all inaccessible owing to the nature of the sites selected, either in natural holes in the lava or under large boulders, and no eggs were secured. A night was spent on the top of the island in a heavy cypress growth, about 4000 feet above the sea. Here the Shearwaters were heard all night, their choking, gasping notes coming from all sides as they flew through this grove.

On the San Benito Islands, lying between Guadaloupe and Cerros Islands, I have also found a few *P. opisthomelas* nesting. So far as I have been able to discover, there are no burrows on these islands, all the nests being in small caves, which are nearly filled with deposits of guano left by untold generations of *Puffinus*. The caves are all small and the nests inaccessible but I think that each cave was inhabited by several pairs of birds, judging by the outcry and warning hisses that greeted my approach to the entrance.

About thirty-five miles south of San Benito Islands lies Natividad Island, a lower and more sandy island than those previously mentioned — a condition which seems to suit the requirements of the Black-vented Shearwaters to a nicety, for here are found thousands of them, nesting the full length of the island, some three miles in extent. With the exception of a few rocky slopes and ridges the entire island may be said to be one almost continuous colony. This island I first visited in August, 1896. The size of the burrows at once attracted my attention, and a closer examination revealed the unmistakable tracks of a *Puffinus*. Though the footprints were abundant and fresh, proving that the burrows were still visited at night, all of those examined were unoccupied. I again called at Natividad April 10, 1897, and found the breeding season at its height, each burrow containing either a pair of Shearwaters or one Shearwater and a fresh egg. In no case, I think, did I find an egg in a burrow with two birds. The burrows were usually about ten feet in length, seldom if ever straight, but with one or two sudden turns to the right or left, the nest sometimes being but two feet from the entrance though at the end of a ten foot burrow. Few of the nests were over eighteen inches below the surface, the burrows being for the most part nearly horizontal, and the loose nature of the soil made walking

NESTING COLONY OF WEDGE-TAILED PETRELS (*Puffinus cuneatus*), ON SAN BENEDICTO ISLAND, LOWER CALIFORNIA.

anything but a pleasure, as one constantly broke through into tunnels, the exact location of which it was impossible to determine.

The tracks in the fresh soil about the entrance to the burrows showed the imprint of the tarsus for its full length, showing that the birds rest their weight on the tarsus as much as on the toes.

There was little attempt at nest-building, the eggs for the most part being laid in a depression in the sand at the end of the burrow. In a few cases a number of small twigs and sticks had been placed in the hollow forming a very crude nest. Before the egg is deposited the burrow is occupied by both birds, and I have found them on the nest at least a month before any eggs were laid. Just how early they take to the burrows I am unable to say, not having visited the nesting colony earlier than the first week in March, when all the burrows were occupied.

I have never heard any love notes from this species when in the burrows. Their outcry at night, however, when they emerge from their nests and fly about over the island, is something unique in my experience. The note is a series of choking cries coupled with a hissing, like escaping steam, the same that I have at times heard them utter when disturbed in their burrows. On July 1, I found the burrows on Natividad occupied entirely by young birds that were nearly or quite as large as the adults, but still clothed in down through which were growing a few feathers. They were sooty black above and lighter below. When brought to the light they gave vent to their feelings in the characteristic notes of the adults.

About Cape St. Lucas Townsend's Shearwater (*Puffinus auricularis*) is rather common, and though perfectly distinct specifically it is quite closely related to *P. opisthomelas* and has a similar breeding season. On San Benedicto Island I found a few nesting the last week in May. At this date most of the young were but a few days old, covered with sooty down above, and paler-grayish below. With the smaller young I often found one of the parents, but they were as frequently alone. The burrows were all confined to the higher parts of the island — about 500 feet above the sea, where they were dug among the bunches of thick, tangled grass, and were well scattered, a dozen or so being a large colony. The burrows were not so deep or long as were those of *P. opis-*

thomelas on Natividad, averaging about five feet in length. On Clarion Island this species was again found in a similar location, all of the burrows being confined to a thick growth of grass, on the high parts of the island.

The Clarion colonies were more extensive, each suitable patch of grass being well populated. Few birds were seen at sea during the daytime and at night, those that visited the nests must have been much more silent than is the Black-vented Shearwater, in the vicinity of its colonies, for I do not remember hearing any notes that I could attribute to *P. auricularis* though one or two of those that were dragged from their nests gave vent to their displeasure in notes similar to those of *P. opisthomelas.*

About Cape St. Lucas, and between that point and the Revillagigedo Islands, the Wedge-tailed Shearwater (*Puffinus cuneatus*) is found in abundance in May and June. It probably may occur at other seasons, but as I have not visited the region of the Cape during other seasons I can give no assurance of its doing so. This species is of exceptional interest, as it belongs to a group of Shearwaters new to the North American fauna, and of which little is known. I was so fortunate as to discover a large colony nesting on San Benedicto Island, from which was obtained a fine series of skins with all of the intergrades between the white-bellied phase of '*cuneatus*' and the dusky form described by L. Stejneger from the Sandwich Islands as *knudseni.*

On first landing on San Benedicto, the first of May, I heard a low murmuring noise which seemed to come from the opposite side of the island. Thinking it might come from a rookery of seals, I started out to investigate, but soon found that I was getting no nearer the source of the noise, which possessed a ventriloquial power difficult to locate. I soon, however, found myself surrounded by large burrows which fairly honeycombed the entire south end of the island, which was so completely undermined that one constantly broke through into burrows, frequently sinking to the hips in ground that had every appearance of being solid.

The accompanying photograph (Plate VIII) gives one but a faint conception of the number of burrows, and of course shows but a very small part of the colony.

From many of the holes came moans and sobs in soft low

tones, inexpressively sad and wierd, — the love notes of *Puffinus cuneatus*.

A number of the burrows were opened, and from each were taken two birds, which fought and bit most savagely on being dragged to the light. By far the greater number were in dark plumage, but many showed lighter underparts, and in some cases a perfectly typical '*cuneatus*,' with pure white underparts, was found in the same burrow with a dark '*knudseni*.'

At this date the burrows were about four to five feet in length, most of them running in a nearly horizontal direction along the sides of the steep narrow ravines that everywhere cut this end of the island.

The soil is chiefly of fine pumice, in some places soft and easily excavated, but in others so hard as to require the use of a pick in opening the burrows. In most of the excavations was a rude attempt at nest building, consisting of a few sprigs of green grass and other vegetation which grew about the colony, and on this meagre platform were both birds, but no eggs. Nor did the condition of the birds indicate that the actual nesting season was at hand. About sunset the birds from the island began to seek the water, meeting a similar tide moving in from the sea. They mostly centered about the south end of the island, which soon presented the appearance of a vast beehive. Thousands upon thousands of Shearwaters were circling about with easy flight, much more airy and graceful than that of any Shearwater with which I am familiar; especially was the difference accentuated when an occasional *auricularis* with typical Shearwater flight, skimmed through the throng. The greater part of those birds which came from the higher parts of the island descended at an angle of about 45°, with wings set until near the water, when they sailed off over the waves until lost to view, while others descending in a spiral course joined their fellows in circling about the water at the foot of the cliffs. There was little, if any, outcry, though the sobbing notes were often heard from the birds on shore. One bird — doubtless an albino — had a pure white head and dusky body, strongly suggestive of a Heermann's Gull. It circled several times about our skiff, which was an object of great interest to the busy throng.

Thinking I would find eggs, I returned to San Benedicto from Socorro Island two weeks later, but was disappointed. Many of the burrows were empty, and all had been extended two feet or more in length, and the nest of green plants moved back to the end. As before, when birds were found there were usually two.

The two following weeks were spent at Clarion, between two and three hundred miles west of San Benedicto. At Clarion, *P. cuneatus* was rare, and only seen at sea. Neither here nor at Socorro were there any signs of nesting colonies. San Benedicto was reached again May 31, and though dozens of burrows were opened, scarcely any birds were found. The tunnels had now a length of from eight to ten feet, having been extended another two feet or more, and as before the nesting material moved to the end. The few birds found were generally in the shorter burrows, which were perhaps incomplete. Only one egg was found with the parent, a white-bellied bird.

Toward evening a greater percentage of birds began to appear from seaward, but at no time before dark did the numbers congregated about the island equal those seen a month earlier.

From the data obtained I would place the nesting season of *P. cuneatus* at least three months later than that of either *opisthomelas* or *auricularis*, which both deposit their eggs at about the same time, in early March.

DESCRIPTIONS OF THIRTY NEW NORTH AMERICAN BIRDS, IN THE BIOLOGICAL SURVEY COLLECTION.

BY E. W. NELSON.

RECENT study of the rich collection of Mexican birds accumulated by the Biological Survey has thrown much light on the southward extension of the life zones found within the United States. Many genera are represented in the various faunal areas by distinct species, while in other cases wide ranging species are broken up into geographic races. The series of specimens from almost every part of Mexico now in the collection show the existence of various hitherto unsuspected subordinate faunal areas, and has proved rich in types of new species and subspecies. The present paper gives some of the results of recent preliminary work on the collection.

I am greatly indebted to Mr. Robert Ridgway, Curator, and Dr. Chas. W. Richmond, Assistant Curator of Birds, in the U. S. National Museum, for cordial assistance during the preparation of this paper. All measurements are given in millimeters.

Crypturus inornatus, sp. nov. BROWN-BACKED TINAMOU.

Type, No. 158434, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Metlaltoyuca, Puebla, Mexico, February 14, 1898, E. A. Goldman.

Distribution. — Dense, humid tropical forests of northern Vera Cruz and adjacent part of Puebla.

Specific characters. — Nearest *C. mexicanus*, from which the males may be distinguished by their deep reddish brown, slightly barred backs and more rufous underparts; the females are much deeper, more reddish brown both above and below.

Description of adult male (type). — Crown and forehead black slightly suffused with grayish; nape dark reddish brown becoming light vandyke brown with a faint purplish bloom on back and sides of neck and fore part of shoulders; shoulders and upper back plain, dark burnt umber; rump and upper tail-coverts lighter, more rusty brown and sparsely and indistinctly barred with black; primaries and secondaries dark slaty edged with brownish; wing-coverts, scapulars and tertials slightly paler brown than back and finely and indistinctly maculated but not barred with blackish; sides

of head to upper part of neck cinnamon brown; chin and throat white; under side of neck along median line dingy grayish brown shading into surrounding color; breast deep, dark cinnamon brown becoming darker and browner on sides, and clearer, paler cinnamon along median line; abdomen, flanks and under tail-coverts mixed buffy, whitish and dull cinnamon obscurely and coarsely barred with blackish.

Dimensions of type. — Wing, 166; tail, 56; culmen, 29; tarsus, 52.

Description of adult female from type locality. — Crown rusty, grayish brown (becoming bright rusty brown on nape) and obscurely barred with black; back and sides of neck bright rusty cinnamon; middle of fore part of shoulders tawny, sepia brown becoming dark cinnamon brown on sides; interscapular region dark umber brown shading into cinnamon on upper tail-coverts with entire back coarsely and obscurely barred with black; upper surface of wings slaty blackish coarsely barred with tawny cinnamon; sides of head tawny cinnamon with a vinaceous shade on adjacent part of neck; chin and throat white; under side of neck dark ashy washed with rusty brown; breast bright rusty cinnamon, darkest on sides and palest next abdomen; abdomen and flanks dull buffy, obscurely and coarsely barred with blackish; under tail-coverts deep buff coarsely maculated with black.

Dimensions of female. — Wing, 165; tail, 54; culmen, 29; tarsus, 52.

General notes. — The darker color and absence of black bars on wings and fore back of the males separate this bird at once from its nearest ally, *C. mexicanus*. The females are less distinct; the darker back and brighter colored nape and neck of *C. inornatus* suffice, however, to distinguish it at a glance.

Both *Crypturus mexicanus* and *C. occidentalis* inhabit the low, scrubby thickets of arid tropical districts and may be distinguished from their Mexican congeners of the more humid districts by their much paler colors. The general resemblance of *C. mexicanus* of Tamaulipas in eastern Mexico to *C. occidentalis* of Tepic, on the opposite side of the Continent, but living in very similar climatic conditions, is much greater than that of *C. mexicanus* to *C. inornatus* living in contiguous districts but with marked climatic differences.

Dendrortyx macrourus dilutus, subsp. nov. MICHOACAN WOOD GROUSE.

Type, No. 155562, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Patzcuaro, Michoacan, Mexico, August 2, 1892, E. W. Nelson.

Distribution.—Mixed oak and pine forest on the Sierra Madre of Michoacan.

Subspecific characters.—About equal in size to *D. macrourus* with broad central stripes of rusty chestnut on feathers of underparts nearly as far back along sides as in *D. m. striatus.* In general color, most like typical *D. macrourus* but rusty chestnut about neck and under parts paler; back, upper surface of wings, tail and sides of body with a decidedly less gray and more brownish suffusion; bill very heavy and tumid and only equalled by that of *D. oaxacæ.*

Dimensions of type.—Wing, 167; tail, 155; culmen, 19; tarsus, 56.

General notes.—It is with some hesitation that I name still another form of *Dendrortyx macrourus*, yet the bird described above differs so much from any of the known forms that I see no other course to pursue. This appears to be one of those species which are in such a plastic condition that comparatively slight changes in climatic conditions, accompanied by partial geographic isolation, produce appreciable differences. In such cases it appears preferable, when the differences are sufficiently marked, to recognize these local forms, rather than to ignore them and include an entire group of geographic races under a single name, as would be the only other logical method.

Cyrtonyx montezumæ mearnsi, subsp. nov. MEARNS'S QUAIL.

Type, No. 142385, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Ft. Huachuca, Arizona, April 30, 1892, Dr. A. K. Fisher.

Distribution.—Southwestern Texas and the southern half of New Mexico and Arizona, ranging thence into northern Mexico.

Subspecific characters.—In both sexes generally paler than true *C. montezumæ;* the males much grayer or more ashy on upper side of wings and paler brown on back; posterior part of crest decidedly lighter brown; sides of breast and body paler slaty gray and more thickly white-spotted. The females have paler backs with broader and more conspicuous pale shaft streaks, especially on rump.

Dimensions of type.—Wing, 117; tail, 58; culmen, 14; tarsus, 30.

General notes.—The Montezuma or Massena Quail of the Southwestern United States occupies a more arid region than that inhabited by the typical birds of the mountains bordering the Mexican

tablelands farther south and, as might be expected, indicates this difference in environment by its paler colors. The birds of southern Arizona are typical of this pale form. It is named for Dr. Edgar A. Mearns, U. S. A., in recognition of the great amount of zoölogical work he has done in the region which it inhabits.

Amazona oratrix tresmariæ, subsp. nov. TRES MARIAS PARROT.

Type, No. 156735, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Maria Madre Island, Tres Marias group, Western Mexico, May 4, 1897, E. W. Nelson and E. A. Goldman.

Distribution.—Tres Marias Islands, western Mexico.

Subspecific characters.—Distinguished from true *A. oratrix* by rather light, grass green back, more bluish green underparts and much greater extension of yellow on neck, especially on under side.

Dimensions of type.—Wing, 230; tail, 125; culmen, 34; tarsus, 26.

General notes.—The type of Mr. Ridgway's *A. oratrix* came from Petapa, Oaxaca, not far from Tehuantepec City. From this point they range through Western Mexico at least to the State of Colima, and crossing the Isthmus of Tehuantepec reach Central Tamaulipas in Eastern Mexico. Birds from all parts of this wide range are nearly uniform in color and agree in having the yellow on the sides of the head and under side of the neck rarely extending farther back than the ear-coverts and middle of the throat. In the Tres Marias form, the yellow on the adult birds commonly covers the entire head and neck and often encroaches on the shoulders and breast. The back of true *A. oratrix* is oil green. Very old birds of both forms often have the yellow feathers on the hind neck, and sometimes on the lower neck, edged or banded with dark red. This is much more pronounced in specimens from the Tres Marias than in those from the mainland.

Momotus lessoni goldmani, subsp. nov. GOLDMAN'S MOTMOT.

Type, No. 155138, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Motzorongo, Vera Cruz, Mexico, March 5, 1894, E. W. Nelson and E. A. Goldman.

Distribution.—Humid tropical forests of Vera Cruz, adjacent part of Oaxaca, and south along the Gulf Coast probably to Yucatan.

Subspecific characters.—Body much greener than *M. lessoni* with only a light suffusion of brown on breast; blue border of crown paler, with only a trace of or entirely lacking the rich smalt blue along posterior border.

Description of type.—Lores, cheeks and line over eyes and isolated oval area on middle of crown black; black crown patch broadly bordered by pale greenish blue nearly uniform and never showing more than a trace of rich smalt blue border posteriorly, so conspicuous in true *M. lessoni;* dorsal surface, including sides of head, back of eyes, neck and back light olive green anteriorly and shading into grass green on lower back, rump and upper tail-coverts; tail grass green at base, shading gradually into blue near end and tipped with black; primaries edged with dark greenish blue, this color shading through dark bluish green on secondaries to nearly dark green on tertials; chin and throat light grass green shading imperceptibly into olive green of neck, breast and sides of body, and thence into clearer green on abdomen and flanks.

Dimensions of type.—Wing, 142; tail, 246; culmen, 49; tarsus, 32.

General notes.—This subspecies may be easily distinguished by the absence of nearly all of the dark rufous suffusion which gives a strong reddish shade to the underparts of *M. lessoni*, and by the lighter, greener back and uniform greenish blue border of the crown. Specimens from Huehuetan on the Pacific coast of Chiapas, are nearly typical *M. lessoni*, as are those from Costa Rica. *M. lessoni goldmani* appears to be found only on the Gulf Coast of Mexico. The type of *M. lessoni* came from Realejo, Nicaragua.

Melanerpes frontalis, sp. nov. CHIAPAS WOODPECKER.

Type, No. 154938, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. San Vincente, Chiapas, Mexico, December 12, 1895, E. W. Nelson and E. A. Goldman.

Distribution.—Known only from type locality.

General characters.—Scarlet crown patch usually small and separated from orange yellow nape by a dark smoky gray area; back broadly barred black and white; rump and middle tail-feathers strongly barred black and white. Pattern of markings on head and back most like that of *M. hoffmanni.*

Description of type.—Nasal tufts pale yellowish; forehead dull white with backward extension of same along sides of crown to middle of orbits,

enclosing on sides the small crown patch of scarlet; latter separated from rich orange nape by broad band of dark smoky gray nearly uniform with rest of head, neck and breast; middle of back and rump broadly barred with black and white as in *M. hoffmanni* (the white bars much broader than in *M. santacruzi*); upper tail-coverts white, with broken V-shaped black markings; middle tail-feathers white broadly barred on basal third and along inner webs, except at tips, with black; border of outer webs on distal third and entire tips black, upper surface of wings broadly barred with white; middle of primaries with irregular but well marked white area; abdomen barred with dull black and white and thinly washed with orange yellow; under tail-coverts white heavily barred with black; two outer tail feathers black with well marked white bars.

Dimensions of type. — Wing, 135; tail, 81; culmen, 30; tarsus, 21.

General notes. — *M. frontalis* resembles *M. hoffmanni* of Costa Rica, but is considerably larger, with a smaller red patch on the crown, and the lower parts are much paler gray with a paler wash of yellow on the abdomen. The crissum is strongly barred black and white in place of the V-shaped marks of *M. hoffmanni* and the two outer tail feathers are distinctly barred with white.

Melanerpes santacruzi fumosus, subsp. nov. SMOKY-BREASTED WOODPECKER.

Type, No. 154964, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Huehuetan, Chiapas, Mexico, March 2, 1896, E. W. Nelson and E. A. Goldman.

Distribution. — Pacific Coast district of southern Chiapas and adjacent part of Guatemala.

General characters. — Generally similar to *M. santacruzi* but smaller with heavier bill, darker back; under parts grayer, less brownish; lower rump and upper tail-coverts barred or marked with black.

Description of type. — Nasal tufts faintly washed with yellow; forehead dull whitish; crown and nape with a broad continuous band of scarlet tinged posteriorly with golden; back and top of wings broadly barred with black and narrowly barred with white; rump white irregularly marked with black; upper tail-coverts with black shaft lines; middle tail feathers black, lateral ones inconspicuously marked with white; sides and under parts of head, neck and body to abdomen dark, dingy, smoky gray with a slight brownish tinge; abdomen obsoletely barred with black and dull whitish and washed with orange; under tail-coverts strongly barred black and white.

Dimensions of type. — Wing, 137; tail, 76; culmen, 31; tarsus, 22.

General notes. — This form differs from *M. polygrammus* by its much darker back and underparts; its barred and black-marked rump and upper tail-coverts and generally unmarked rectrices and more heavily barred under tail-coverts.

Melanerpes dubius verærucis, subsp. nov. VERA CRUZ WOODPECKER.

Type, No. 154835, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Coatzacoalcos, Vera Cruz, Mexico, April 15, 1896, E. W. Nelson and E. A. Goldman.

Distribution. — Southern half of Vera Cruz, Tabasco, and bordering part of Chiapas.

Subspecific characters. — Smaller than *M. dubius* with broader white frontal area and rather broader white barring on dorsal surface; sides and lower part of head, neck, and body darker, more brownish gray; crissum more heavily barred with black.

Dimensions of type. — Wing, 124; tail, 76; culmen, 29; tarsus, 23.

General Notes. — This form inhabits a region of much greater humidity than that of typical *M. dubius* and a specimen from the heavily forested region of Chiapas is darker than Vera Cruz birds and probably represents the extreme of the form in this respect.

Dryobates villosus intermedius, subsp. nov. TABLELAND WOODPECKER.

Type, No. 154901, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Villar, San Luis Potosi, Mexico, September 22, 1892, E. W. Nelson.

Distribution.—Arid mountains of the southern and eastern part of the Mexican tableland, north of the valley of Mexico.

Subspecific characters.—Intermediate in size between *D. v. hyloscopus* and *D. v. jardinii*. The upper surface of wings scantily white-spotted much as in *D. jardinii;* lores mainly black; throat, lower side of neck and breast smoky gray, much paler than in *D. jardinii*, abdomen more whitish and under tail-coverts white; stripe down back washed with smoky but much paler than color of breast.

Dimensions of type.—Wing, 121; tail, 76; culmen, 28; tarsus, 23.

Nyctibius jamaicensis mexicanus, subsp. nov. MEXICAN GOATSUCKER.

Type, No. 158535, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Metlaltoyuca, Puebla, Mexico, January 26, 1898, E. A. Goldman.

Distribution.—Eastern coast region of Mexico north to northeastern Puebla.[1]

Subspecific characters.—Similar to *N. jamaicensis* but decidedly larger and browner, this last character being specially marked on lesser wing-coverts; pale spots along outer border of primaries much duller gray in less vivid contrast to dark part of feathers.

Measurements of type.—Wing, 310; tail, 220; culmen, 29; tarsus, 16.

General notes.—An adult ♀ from the same locality as the type measures, wing, 304; tail, 224; culmen, 26; tarsus, 14. An adult bird, sex unknown, but probably a male, from Mirador, Vera Cruz, measures: wing, 310; tail, 220; culmen, 24; tarsus, 15. A specimen from the island of Jamaica and representing typical *N. jamaicensis* measures: wing, 275; tail, 186; culmen, 23; tarsus, 13.

Antrostomus oaxacæ, sp. nov. OAXACA WHIPPOORWILL.

Type, No. 154735, ♀ ad., U. S. Nat. Mus., Biological Survey Collection. Near City of Oaxaca, Oaxaca, Mexico, August 14, 1894, E. W. Nelson and E. A. Goldman.

Distribution.—Sierra Madre bordering southern part of Mexican table-land from Michoacan through Oaxaca to adjacent part of Chiapas.

Specific characters.—Most closely related to *A. macromystax* but back darker; black spots on scapulars larger; feathers of nape rather coarsely barred with black and reddish brown; middle of back and rump heavily streaked with black and spotted and mottled with reddish and grayish brown; below entire breast and sides of body blackish coarsely marked with irregular spots of grayish and reddish brown; the fine maculation of back and breast characteristic of *A. macromystax* almost wholly replaced in this species by coarser spotting, rendering the two easily separable.

Dimensions of type.—Wing, 162; tail, 119; culmen, 14; tarsus, 18.

[1] This species has been recorded from Mazatlan, Sinaloa, and thence southward on the Pacific Coast of Mexico, and the birds found there probably belong to the present subspecies, but I have seen no specimens from that region, so cannot be certain.

General notes.—It is possible that the present bird may be found to be a subspecies of *A. macromystax* but this appears rather unlikely considering the typical character of specimens of the latter taken on the border of the range of *A. oaxacæ.*

Antrostomus chiapensis, sp. nov. CHIAPAS WHIPPOORWILL.

Type, No. 154737, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Valley of Comitan, Chiapas, Mexico, December 11, 1895, E. W. Nelson and E. A. Goldman.

Distribution.—Known only from type locality near border of Guatemala.

Specific characters.—Darker even than *A. salvini*; back and upper surface of wings spotted and barred with rufous brown; under parts blackish coarsely marked with dull buffy; under tail-coverts not barred.

Description of type.—Crown with broad median streak of black with a few oval rufous brown spots along borders; sides of crown rather coarsely mottled with black, gray and brown; foreback black obscurely barred with dull rufous brown; rest of back, rump and upper tail-coverts black with transverse spots of rufous brown on edges of feathers, most heavily marked on coverts; scapulars black with large spots of rusty buff along borders; upper surface of wings and outer edges of primaries distinctly spotted with a deeper shade of same; upper surface of tail black rather finely mottled with rusty and dark grayish forming indistinct V-shaped bands; sides of head blackish mixed with dark golden buffy; chin and throat black irregularly barred with dingy rusty and rusty whitish, succeeded by a narrow white collar; rest of underside of body black, coarsely but obscurely barred with grayish and rusty brown on forebreast; coarsely spotted with pale dingy, rusty white on rest of breast and sides, and broadly but obscurely barred with dark, dingy buff; under tail-coverts dark buff with hidden shaft bands of black; inside of inner webs of primaries almost uniform black with only slight traces of dark rusty spots; white on outer ends of tail feathers about as in *A. vociferus.*

Dimensions of type.—Wing, 169; tail, 127; culmen, 14; tarsus, 18.

General notes.—The only specimen taken of this well marked species was secured in the border of the mixed oak and pine forest on the highlands of Chiapas near the Guatemalan line.

Cypselus brunneitorques griseifrons, subsp. nov. NORTHERN RUFOUS-COLLARED SWIFT.

Type, No. 157055, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Santa Teresa, Territory of Tepic, Mexico, August 8, 1897, E. W. Nelson and E. A. Goldman.

Distribution.—Sierra Madre Mountains of Tepic, Jalisco, Western Zacatecas and Southern Durango, Mexico.

Subspecific characters.—Male differs from typical *C. brunneitorques* in more distinctly gray edges to feathers of forehead and over eyes; smaller dark throat patch; paler, more rusty rufous collar; with paler and more grayish shade of black over entire body. The female differs from typical birds in its grayer forehead; darker chin and throat; grayer and less brownish shade to black on entire body; and in having the rump paler than rest of back, forming a poorly marked rump patch.

Dimensions of type.—Wing, 122; tail, 41; culmen, 5; tarsus, 12.

Thalurania ridgwayi, sp. nov. RIDGWAY'S THALURANIA.

Type, No. 155981, U. S. Nat. Mus., Biological Survey Collection. San Sebastian, Jalisco, Mexico, March 18, 1897, E. W. Nelson and E. A. Goldman.

Distribution.—Known only from type locality.

Specific characters.—Readily distinguished from other known members of the genus by the dark, non-metallic underparts.

Description of type.—Top of head from base of bill to middle of crown dark metallic blue; rest of crown dark, rather dull bluish green; sides of head, back of eyes, upper half of neck and entire back bronzy green, darkest on upper tail-coverts; wings dark purplish brown; tail lustrous black with slight purplish gloss; chin, sides of head to lower side of orbits, and entire under side of neck brilliant metallic green; under side of body dull blackish washed with metallic greenish on sides; under coverts lustrous black.

Dimensions.—Wing, 57; tail, 33; culmen, 17.

General notes.—This species extends the range of the genus from Honduras to Central-Western Mexico and is the most unexpected of the results obtained during our brief visit to the 'island' of humid tropical forest found near San Sebastian on the arid tropical west slope of Jalisco. The number of new and interesting birds found during our visit of a few days duration at that locality is sufficient to justify much more thorough work there.

It gives me great pleasure to name this interesting species in honor of Mr. Robert Ridgway.

Empidonax timidus, sp. nov. DURANGO FLYCATCHER.

Type, No. 163905, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. El Salto, Durango, Mexico, July 17, 1898, E. W. Nelson and E. A. Goldman.

Distribution. — Known only from the type locality.

Specific characters. — Much like *E. albigularis* but larger with broader bill and paler colors.

Description of type. — Top of head and back, hair brown, slightly darkest on head and palest on rump; upper tail-coverts broccoli brown; upper surface of wing and tail feathers dull blackish hair brown; secondaries and tertials edged with dull whitish; two distinct wing bands; the anterior one dark buffy, the posterior one buffy whitish; sides of head and neck paler more grayish brown than back with a pale buffy suffusion; sides of breast pale grayish brown; only a faint indication of pectoral band; chin and throat whitish shaded with pale buffy; middle of breast, belly and under tail-coverts dull buffy yellowish, underlaid with pale grayish brown on breast but clear on belly and tail-coverts; under wing-coverts rusty buffy a little paler than in *E. albigularis;* outer web of outer tail feathers a little paler than inner web.

Dimensions of type. — Wing, 62; tail, 57; culmen, 11; width of bill at rictus, 8; tarsus, 17.

Empidonax bairdi perplexus, subsp. nov. OAXACA GREEN FLYCATCHER.

Type, No. 154569, ♀ ad., U. S. Nat. Mus., Biological Survey Collection. Puerto Angel, Oaxaca, Mexico, March 13, 1895, E. W. Nelson and E. A. Goldman.

Distribution. — Arid west coast region of Mexico from near Tehuantepec north to the Territory of Tepic.

Subspecific characters. — Similar to *E. bairdi* but back lighter greenish, wing bands and edgings to secondaries and tertials much paler, more yellowish; larger and paler yellowish area on chin and throat; pectoral band much more restricted, with more of a dull brownish shade; sides of body less heavily washed with olive greenish; rest of lower parts paler yellow.

Dimensions of type. — Wing, 62; tail, 55; culmen, 12; tarsus, 16.5.

General notes. — This form is most readily distinguished from *E. bairdi* by the generally paler color and the much greater extension of the yellow on under parts, the broad area of olive green on the sides of the neck and across the breast being much more restricted and with a more brownish shade.

In 1897 I described *Empidonax bairdi occidentalis* (Auk, XIV, p. 53) and the name was intended to apply to the present form but by an unfortunate slip the specimen chosen and designated as the type, in the light of further material, proves to be strictly referable to *E. bairdi* and it consequently becomes necessary to choose a new type and redescribe the subspecies. The error came about through the fact that both *E. bairdi* and *E. b. occidentalis* occur in winter at Pluma, Oaxaca, the type locality for the last named bird, and are represented in our collection from that point. Nearly typical *E. bairdi* also occurs in winter in western Durango (Chacala) but we took only specimens of *E. b. perplexus* between these two points.

Myiopagis placens jaliscensis, subsp, nov. JALISCO FLYCATCHER.

Type, No. 156022, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. San Sebastian, Jalisco, Mexico, March 18, 1897, E. W. Nelson and E. A. Goldman.

Distribution. — Western Mexico from Southern Sinaloa south at least through Jalisco and Tepic; straying in winter to Tres Marias Islands.

Subspecific characters. — Larger than typical *M. placens* with proportionately as well as absolutely longer tail; top of head paler and grayer; rest of dorsal surface lighter green; yellow of under parts paler.

Measurements of type. — Wing, 70; tail, 70.5; culmen, 11; tarsus, 19.

General notes. — A specimen in the National Museum from the Tres Marias Islands which I referred to *M. placens* in my report upon the birds of those islands belongs to the present subspecies.

Sittasomus sylvioides jaliscensis, subsp. nov. JALISCO RUFOUS-TAILED CREEPER.

Type, No. 156012, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. San Sebastian, Jalisco, Mexico, March 17, 1897, E. W. Nelson and E. A. Goldman.

Distribution.— Known only from the type locality.

Subspecific characters. — Distinguished from the typical *S. sylvioides* of eastern Mexico by its larger size and darker grayish brown underparts.

Dimensions of type. — Wing, 84; tail, 89; culmen, 16; tarsus, 18.5.

Dendrornis flavigaster megarhynchus, subsp. nov. LARGE-BILLED WOODHEWER.

Type, No. 154633, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Puerto Angel, Oaxaca, Mexico, March 9, 1895, E. W. Nelson and E. A. Goldman.

Distribution. — Pacific coast of Oaxaca, and perhaps adjacent part of Guerrero, north of the Isthmus of Tehuantepec.

Subspecific characters. — Larger, with a longer and much heavier bill than either *D. flavigaster* or *D. flavigaster mentalis;* nearly intermediate between the two in color.

Dimensions of type. — Wing, 119; tail, 92; culmen, 45; tarsus, 25.

General notes.—*D. flavigaster* is restricted to the wooded mountain slopes of western Mexico from the Territory of Tepic south to Guerrero where it grades into *D. f. megarhynchus*. The range of *D. f. mentalis* is restricted to Sinaloa and the bordering west slope of the Sierra Madre in Tepic and Durango.

Xanthoura luxuosa speciosa, subsp. nov. JALISCO GREEN JAY.

Type, No. 166055, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. San Sebastian, Jalisco, Mexico, March 13, 1897, E. W. Nelson and E. A. Goldman.

Distribution. — Tropical and subtropical parts of western Jalisco, southern Sinaloa and Tepic.

Description of type. — Nasal tufts and cheek patches intermediate between smalt blue and French blue; crown pale almost campanula blue; spot over and under back part of orbit white, edged with blue; forehead white, shaded with pale yellow; basal part of feathers on entire crown sulphur yellow; black area on sides of head, chin, throat and forebreast, also green on back and tail, about as in typical *X. luxuosa;* sides of neck, a well-marked border to black of breast, and median ventral line thence to vent, chrome yellow; sides of body washed with brighter green than in *X. luxuosa;* under tail-coverts and lateral tail feathers uniform chrome yellow of a richer shade than on breast and median line.

Dimensions of type. — Wing, 125; tail, 150; culmen, 29; tarsus, 41.5.

General notes.—This well-marked subspecies may be at once distinguished from the other races of *X. luxuosa* by the white spots above and below the eyes, the yellow bases of the feathers on the crown and the yellow on the sides of the neck, around the border of the black on the breast, and along the middle of the lower parts. Two specimens in the National Museum from Colima are intermediate between the present form and *X. l. vivida* but are nearest the latter.

Callothorus æneus assimilis, subsp. nov. SMALL RED-EYED COWBIRD.

Type, No. 144490, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Acapulco, Guerrero, Mexico, January 25, 1895, E. W. Nelson and E. A. Goldman.

Distribution.—Pacific coast of Mexico from southern Jalisco and Colima to Chiapas.

Subspecific characters.—Male similar to *C. æneus* but much smaller. Female unknown.

Measurements of type.—Wing, 114; tail, 80; culmen, 21; tarsus, 30.

General notes.—Birds from San Blas, Tepic, are intermediate in size between typical *C. æneus* from Mazatlan and *C. a. assimilis* from Colima and the interior of southern Jalisco.

Sturnella magna alticola, subsp. nov. HIGHLAND MEADOWLARK.

Type, No. 144524, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Ocuilapa, Chiapas, Mexico, August 21, 1895, E. W. Nelson and E. A. Goldman.

Distribution.—Pacific coast of Mexico from Salina Cruz, Oaxaca, to Tonala, Chiapas, and thence through the high interior of Chiapas and the highlands of Guatemala at least to Dueñas.

Subspecific characters.—Similar to *S. magna* of the eastern United States but intermediate in size between it and the pigmy *S. m. inexspectata*; the bill smaller than in *S. magna* but tarsus relatively and absolutely longer, averaging about 43 mm.; yellow of throat extends up on middle of whitish malar stripe but never occupies all of it as in *S. neglecta*.

Dimensions of type.—Wing, 113; tail, 70; culmen, 32; tarsus, 43.

General notes.—This form may be readily separated from *magna*, *mexicana*, *inexspectata* and *hoopesi* by its proportions and by the yellow on the malar stripe, and from *neglecta* by its darker colors.

Quiscalus macrourus obscurus, subsp. nov. GUERRERO GRACKLE.

Type, No. 144595, ♀ ad., U. S. Nat. Mus., Biological Survey Collection. Acapulco, Guerrero, Mexico, January 14, 1895, E. W. Nelson and E. A. Goldman.

Distribution. — Pacific coast region of Mexico from San Blas, Tepic, to southern Guerrero.

Subspecific characters. — Similar to but smaller than true *Q. macrourus* Males scarcely distinguishable in color but females very much darker than those of the typical bird.

Description of type. — Above brownish black glossed with dull greenish; head a little browner than middle of back; below very dark almost blackish with greenish; throat and neck only slightly paler than rest of under parts.

Dimensions of type. — Wing, 159; tail, 162; culmen, 32; tarsus, 45.

Amphispiza bilineata pacifica, subsp. nov. SONORA BLACK-THROATED SPARROW.

Type, No. 164339, ♀ ad., U. S. Nat. Mus., Biological Survey Collection. Alamos, Sonora, Mexico, December 29, 1898, E. A. Goldman.

Distribution. — Pacific coast region of southern Sonora and northern Sinaloa.

Subspecific characters. — In general appearance similar to true *A. bilineata* from Texas but with much smaller white spots on ends of tail feathers, in this character agreeing with *A. b. deserticola* from which it differs in darker color and smaller size.

Dimensions of type. — Wing, 63; tail, 57; culmen, 10; tarsus, 19.

Vireo perquisitor, sp. nov. VERA CRUZ VIREO.

Type, No. 164084, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Papantla, Vera Cruz, Mexico, March 12, 1898, E. A. Goldman.

Distribution. — Heavily forested coast country in northern Vera Cruz.

General characters. — Resembles *V. noveboracensis* but smaller with darker, slenderer bill, and much darker and duller colors above and below, especially on throat and breast.

Description of type. — Bill rather slender, black; lores orange yellow; crown and rest of dorsal surface olive green, slightly darkest on crown and greenest on rump; upper surface of wings and tail grayish black, the feathers mostly edged with green like back; wing-coverts the same with yellowish white tips to greater and lesser coverts, forming two well-marked wing bands; eye with narrow white ring; cheeks, ear-coverts and sides of neck dark olive gray; a paler shade of same extending as a dark wash over pale greenish yellow of chin and throat and over darker greenish yellow of breast and sides of body; a small whitish area on middle of belly; abdomen mainly, and all of under tail-coverts, Naples yellow.

Dimensions of type. — Wing, 57; tail, 45; culmen, 11.5; tarsus, 18.

Vireo amauronotus strenuus, subsp. nov. CHIAPAS VIREO.

Type, No. 143399, ♀ ad., U. S. Nat. Mus., Biological Survey Collection. Tumbala, Chiapas, Mexico, November 5, 1895, E. W. Nelson and E. A. Goldman.

Distribution. — Heavily forested mountain slopes up to 5000 feet in northern Chiapas.

Subspecific characters. — Smaller than true *V. amauronotus* with longer, slenderer bill; crown and back darker, more smoky brownish (former almost blackish) with less greenish shading on back and wings; color of under parts same as in *V. amauronotus*.

Dimensions of type. — Wing, 68; tail, 47; culmen, 12.5; tarsus, 18.

Basileuterus belli scitulus, subsp. nov. GUATEMALAN WARBLER.

Type, No. 143293, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Todos Santos, Guatemala, December 30, 1895, E. W. Nelson and E. A. Goldman.

Distribution. — Highlands of Chiapas and Guatemala.

Subspecific characters. — Larger than *B. belli* from northeastern Mexico, and decidedly darker green on back and darker yellow on under parts with heavier wash of green on sides.

Dimensions of type. — Wing, 65; tail, 61; culmen, 12; tarsus, 23.

General Notes. — An average male of nearly typical *B. belli* from northeastern Mexico (Mt. Zempoaltepec) measures as follows: Wing, 57; tail, 60; culmen, 11; tarsus, 22.5.

Geothlypis trichas modestus, subsp. nov. SAN BLAS YELLOWTHROAT.

Type, No. 157204, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. San Blas, Territory of Tepic, Mexico, June 12, 1897, E. W. Nelson and E. A. Goldman.

Distribution. — West coast of Mexico from southern Sinaloa south at least to Colima.

Subspecific characters. — Smaller than typical *G. trichas* from the eastern United States, with the green of back darker, more brownish olive and brownish flanks; black frontlet and white border to same nearly as in *G. t. occidentalis*.

Dimensions of type. — Wing, 52; tail, 49; culmen, 12; tarsus, 19.

General notes. — This small dark form is resident in the area given for its range and we took young birds at San Blas in June. The young as well as the adults are distinguishable by their dark color.

Thryothorus felix grandis, subsp. nov. MORELOS WREN.

Type, No. 142949, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Yautepec, Morelos, Mexico, January 18, 1893, E. W. Nelson.

Distribution. — Southwestern Puebla, Morelos and adjacent part of Guerrero.

Subspecific characters. — Much larger than the other forms of this species; paler than true *T. felix* and darker than the pale Sinaloa form.

Dimensions of type. — Wing, 60; tail, 61; culmen, 18; tarsus, 23.

General notes. — These Wrens are very common in brushy places of the arid and semitropical country they inhabit, and like their near relatives are very musical.

Harporhynchus curvirostris maculatus, subsp. nov. SONORA THRASHER.

Type, No. 164734, ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Alamos, Sonora, Mexico, December 23, 1898, E. A. Goldman.

Distribution. — Southern Sonora, northern Sinaloa and southwestern Chihuahua (on western slope).

Subspecific characters. — Most closely related to *H. c. occidentalis* from which it may be distinguished by its darker colors and smaller size.

Dimensions of type. — Wing, 105; tail, 115; culmen, 29; tarsus, 36.

General notes. — This is the darkest of all the races of *H. curvirostris* and has a heavy wash of brownish gray on the lower parts which becomes heaviest on the distinctly spotted breast. The abdomen and under tail-coverts are deep fulvous buffy washed with gray.

A NEW SUBSPECIES OF THE GENUS *HYLOCICHLA.*

BY REGINALD HEBER HOWE, JR.

SINCE I published my paper on 'The Ranges of *Hylocichla fuscescens* and *Hylocichla fuscescens salicicola*' in 'The Auk' for January, 1900 (Vol. XVII, No. 1, pp. 18–25), I have had quite a number of additional specimens sent me for examination and identification. These have forced me to recognize that a subspecific difference exists between the *Hylocichla fuscescens salicicola* of the West and the bird inhabiting Newfoundland, which in my former paper I referred to this same race. I noticed at that time that a slight difference did exist, but did not deem it worthy of separation; not being in favor of describing slight variations. I am now, however, of the opinion that the Newfoundland bird is subspecifically distinct from the western *salicicola*, though nearer this race than to *Hylocichla fuscescens*. This difference, now apparent, proves the necessity of having, in describing species and subspecies, very large series with which to work. My former paper was based on the examination of far more specimens than a great many of our recognized subspecies have been described from, and yet the addition to that series has proved that if the western race *salicicola* is recognized the race inhabiting Newfoundland also must be, or in other words that the former series of thirty-six specimens only barely suggested what the addition of eleven more specimens proves.

Hylocichla fuscescens fuliginosa, subsp. nov.

Type, from Codroy, Newfoundland, No. 46260, adult. Coll. of William Brewster. Collected May 31, 1895, by Ernest Doane.

Geographical Range. — Newfoundland (also possibly Anticosti and Labrador).

Subspecific Characters.—Size slightly larger. Upper parts, especially on the head, distinctly *brownish*, much darker and not of the tawny shade of typical *fuscescens*, and *lacking* the greenish tinge of *salicicola*. Throat, lores, and upper breast suffused with *buff*, though perhaps less so than in *fuscescens* (in *salicicola* buff is practically absent), the upper breast and usually also the throat spotted *heavily* with *broad* arrow-shaped brown markings suggesting very strongly the throat and breast of *H. u. swainsonii*. The breast markings of both *fuscescens* and *salicicola* are narrow and more penciled and lighter in shade. Bill darker and heavier.[1]

Remarks.—The two specimens already recorded from Rhode Island, and the ones from Ottawa, Ontario, are referable to this race, as is also a male kindly loaned me by Dr. Louis B. Bishop, taken at New Haven, Conn., on September 23, 1895. The specimen recorded from Chester, South Carolina, is probably referable to this new race, rather than to *salicicola*. Another specimen sent me by Dr. Bishop from the Magdelen Islands, taken June 13, 1887, is intermediate between *fuscescens* and *fuliginosa*, although difficult to determine on account of being in worn, breeding plumage. Dr. Bishop has also kindly sent me an adult male (No 4116) taken May 6, 1899, in New Haven County, Conn., and an adult female (No. 4950) taken May 16, 1900, in the same locality, both referable to *fuliginosa*, and the first spring specimens from New England I have seen.

[1] For measurements see Tables with former paper. Auk, Vol. XVII, No. 1, pp. 22, 33.

AN ACCOUNT OF THE NESTING HABITS OF FRANKLIN'S ROSY GULL (*LARUS FRANKLINII*), AS OBSERVED AT HERON LAKE IN SOUTHERN MINNESOTA.[1]

BY THOMAS S. ROBERTS, M. D.

[*With Photographs from Nature by the Author.*]

THE LOCALITY where the following observations were made is a great marshy lake far out in the vast prairie region of southwestern Minnesota. It lies in Jackson County, one of the most southerly tier of counties of Minnesota, and is fifty-six miles from the eastern line of South Dakota and thirteen miles from the northern line of Iowa. The southeastern end of the lake is at about 43° 45′ north latitude, and 95° 20 west longitude. Heron Lake, with certain neighboring sloughs within a radius of ten or fifteen miles, is the southernmost station at which Franklin's Gull is know to nest. For many years after its first discovery in the Fur Countries by Dr. John Richardson, early in the third decade of the present century, it was considered to be a strictly boreal breeding species. And it was not until after the invasion of its nesting grounds at Shoal Lake and other Manitoban localities by Mr. Donald Gunn in 1867 that fragmentary accounts began to appear from time to time disclosing the fact that many little bands of these birds cut short their northward flight to make their summer home on the prairies of North Dakota and western Minnesota. To the present day little of definite character has appeared in our general works on ornithology in regard to the nidification of the species. Several short articles in collector's journals have appeared, most notable among them, and the source of much of the quoted information of late years, being an article by J. W.

[1] This article consists of extracts from a paper read at the meeting of the American Ornithologists' Union in Philadelphia, November 15, 1899. The original paper, somewhat elaborated and accompanied by a considerable series of illustrations from photographs from nature, is at present in course of publication by the Minnesota Geological and Natural History Survey.

FRANKLIN'S GULL ON NEST.

Preston on 'The Breeding of Franklin's Gull in Minnesota,' published in 1886 in the 'Ornithologist and Oologist' (Vol. II, p. 54). Preston's notes were based upon observations made during a visit to the Heron Lake colony several years previous to the first visit made by the writer. The material for the present article is the accumulation of three trips in three different years to the same general locality. On the last visit the Gulls were studied at intervals for a period of fifteen days, under most favorable and varied conditions, and a series of photographs embracing about one hundred negatives was secured, a selection from which is presented herewith. My companion on this latter expedition was Mr. Leslie O. Dart, and I wish here to acknowledge a by no means inconsiderable indebtedness to him for the successful issue of our work, especially in the photographic line. To his able coöperation is due very largely the beauty of the best of the illustrations accompanying this paper.

About the time of the final loosening of the ice in mid-April the vanguard of the Rosy Gulls arrives, and by the time the surface is clear they are coursing back and forth in great numbers over the broad expanse of open water that presents itself at this season of the year. The transients soon pass on or scatter to neighboring sloughs, and the Heron Lake Colony, proprietors by right of no one knows how many years of occupancy, select with much noisy consultation the location for the year. The mating contests over and settled, the busy, turbulent throng then begin the work of nest-building, which consumes the first few days of May, so that by the middle of that month the laying of the eggs has begun, and in three or four days thereafter the sets are complete, and the tedious task of incubation has begun. These dates are sometimes anticipated a little, while on the other hand a late season may cause delay, so that the depositing of the eggs may occur as early as the end of April or be postponed until the latter part of May. The Rosy Gull, like others of its family, nests strictly in colonies, and even on a lake as large as Heron Lake, all the individuals there resident congregate at one place and build their nests close together. But, unlike most birds breeding in colonies, the site chosen is rarely the same on any two successive seasons. Just why this should be so is not evident. It

seems to be due chiefly to an inherent fickleness on the part of the bird. This Heron Lake colony moves about from place to place, sometimes in the Upper Lake, sometimes in the Lower Lake, choosing locations in different years that may be miles apart, and varying to some extent in character.

Preston found them in 1886 at the extreme lower end of the lake, within sound and in plain sight of the village. In 1892 they settled on a spot further up the lake and close to the Herony. Here they built their nests among the standing bull-rushes fringing the open water, and a sudden rise in the level of the lake in early June broke most of their nests from their moorings, and they were carried by heavy winds out into open water and destroyed. The following year a location was selected close by the scene of this disaster, but considerably further in shore where the water was not over two feet deep and the growth of grass, flags and rushes, rank and thick, and so matted and bent by the snows of many winters that a safe and lasting harbor was insured. Here I visited them May 21 and 22 with Thomas Miller as guide, and found the nests of this colony of some two or three thousand Gulls placed so closely together that a dozen or more could easily be reached at one time from a small skiff forced in almost anywhere among them. While most of the nests were well built of reeds and rush stems, many of the birds had taken advantage of the secure and elevated foundations afforded by the broken down and matted vegetation to deposit their eggs in very indifferently put together nests. In this inside position, affording such good cover and so easily accessible from land, the birds were exposed to much annoyance by egg-hunting marauders, especially mink, judging from the number of despoiled nests observed.

After an unsuccessful attempt to find the Gulls in 1898, word came in May of the following year that they were once more at their old quarters and, equipped with photographic outfit and accompanied by Mr. Dart, the writer arrived at Heron Lake on the 12th of June. On the 16th we made our way in small hunting boats to the nesting ground, which on this occasion these fickle birds had chanced to locate some four or five miles from any available embarking point. Not a Gull was to be seen until

FIG 1. DISTANT VIEW OF A PORTION OF THE NESTING SITE OF THE FRANKLIN'S GULL COLONY AT HERON LAKE, MINN.

FIG 2. A PAIR OF FRANKLIN'S GULLS ON A FLOATING NEST.

the nesting site was almost reached. At last a few sentinels were sighted and as they announced our approach we rounded a final point of rushes into the comparatively open water of the upper lake (occasioned by recent floods) and there, spread out before us, a half mile distant, lay the object of our long and laborious search.

The surface of the water was everywhere dotted with dark little mounds and hundreds upon hundreds of Gulls filled the air above, circling round and round or hovering for a moment as they settled or rose in their incessant coming and going to and from the nests. And now our ears distinctly told us of the proximity of this interesting spectacle, for even at the distance of half a mile the harsh screams and rattling cries of the whirling mass of birds united to form a wild uproar that was very plainly audible. As we paddled quietly toward the scene of this confusion, and were getting ready our weapons for the noiseless attack we expected to make, the nearest Gulls soon espied us, and with redoubled outcry passed the word to all the rest. And now with one accord, the whole colony came streaming toward us — a few in the lead, but hundreds in the rear — until we were soon surrounded and accompanied the balance of our way by an immense wildly excited escort that by every means known to Gulldom, protested against the intrusion and tried in vain to impede our further progress. The frenzied, distressed notes and the furious dashes of the birds as they all but struck our heads excited both our pity and our admiration.

We made first a general reconnoissance of the entire nesting site.

At a distance of about an eighth of a mile from the marshy, reed-grown shore, the little floating mounds dotted thickly a great crescent-shaped area some three fourths of a mile in length by three or four hundred yards in the widest part. The nests were irregularly distributed. In some places there were many close together, and again they were scattered yards apart, while now and then there were large spaces where there were none at all.

Under ordinary conditions the water over all this area would have been two or three, nowhere over four, feet deep, with a thick growth of bull-rushes (*Scirpus*) standing well above the surface. But heavy rains had raised the lake until the water was in

many places fully six feet deep and only the tops of the tallest rushes came into view; thus changing a large part of the nesting ground from a dense tangled bed of rushes into almost open water. Upon this condition of things the birds of course had not reckoned when they chose the site, and in consequence many of the nests were now torn from their moorings, having been lifted by the rising water, and were unprotected save by the weak tops of the submerged rushes. Thus free to drift, they were floating hither and thither at the mercy of the winds, but, strange to say, this state of things did not appear to greatly disconcert the owners. Here and there a number of nests had caught against some firm anchorage, and receiving new additions with each favorable breeze a windrow or island of these stray nests was soon formed. Nest touching nest in this manner resulted in a promiscuous crowding of families that must have tested the good nature and forbearance of the occupants not a little, and probably led to some vagaries in the care of the young described further on. A few nests had gone adrift entirely, and floating far out into the open water had been abandoned. But luckily a considerable part of the colony, wiser than their fellows, escaped this dire confusion or disaster as the result of having located their nests where shallower water and a stronger growth of rushes provided protection and safe anchorage even when the flood was at its height. From nest-building operations still in progress at the late date of our visit (June 16) we inferred that a few at least of the Gulls that had lost their homes were reëstablishing themselves in safer retreats further back, having perhaps learned a lesson against future similar mishaps.

The number of Gulls in the colony we estimated at between two and three thousand, and by counting certain areas, figured a total of about 1200 nests. Preston, in 1885, thought the colony then numbered 10,000, so that if he guessed anywhere near right, there has been a very considerable falling off in the fourteen years that have elapsed. In the six years between my two visits no appreciable diminution in numbers had occurred, so far as I could judge.

After completing our examination of the nesting ground as a whole, and so spreading consternation throughout the entire

colony, we settled down to quiet contemplation and study of the Gulls and their doings more in detail. All of two days and the greater part of a third day were thus spent, and what we saw in and about this bustling, ever changing community proved so engrossingly interesting and entertaining that the hours spent under a blazing sun within the narrow confines of little ducking boats glided rapidly by and proved all too short. The only discordant feature was the almost unbearably harsh and never ceasing outcry that rang continually in our ears. Now somewhat subdued for a few minutes, now breaking out again with redoubled energy, the wild chorus of shrill screams and cat-like calls made such a deep and lasting impression upon the listener that for many hours afterward it was utterly impossible to still the memory of the whole loud painful outcry.

The nests were all built of the same material — old water soaked bull-rushes — with sometimes a few fresh stems worked into the upper part. A heavy foundation of the thickest and longest rushes is first laid, forming a partly submerged platform held in place by the standing rushes about it, the whole being two to three feet across at the water line. Upon this the rather well made superstructure of finer material is constructed, with a long slope from the water's edge up to the rim of the nest, which is raised eight inches to a foot above the water. The cavity is eight to ten inches in diameter and three to four in depth, and is rudely lined with bits of fine rush tops and coarse grass. The inside is always perfectly dry, being several inches above the water. The variation in the nests was not very great, being merely as to general bulk and height. Much of the material of which the nests were constructed had been carried from a distance, probably from the neighboring shore where the rushes, loosened by the ice, had been cast up in heaps. The Gulls carry with apparent ease these great heavy rushes, and were often to be seen flying about for a considerable time with the long stems dangling from their bills. The nests were kept in good repair, and as they became trampled down or the rim disarranged the owners were to be seen putting things to rights or adding a new rush here and there as it was needed. At the time of our visit many young were already out of the shell, but there were also many

sets of eggs in all stages of incubation, the result probably of second nest-building.

The number of eggs in a nest varies from two to four, the most common clutch being three. They vary endlessly in both color and markings, and there is also a great diversity in shape. The ground color of the eggs varies from an unusual extreme of a very light grayish blue through many shades of umber, olive browns, and grayish browns to the other equally uncommon extreme of a very dark brown, approaching almost a chocolate in depth of coloration. Throughout there is a prevailing olive tint, giving a greenish cast, no matter what the body color. The eggs are marked with irregular blotches and pencillings of many shades of cinnamon brown and fuscous, the more deeply lying pigment producing spots of lilac or olive hue. In some eggs the markings vary little in size, and are evenly scattered over the entire surface; but usually they vary from fine dots to large blotches exceeding even a half inch in length, and are thickest at the large end, where they form a wreath, the markings becoming occasionally almost confluent. The irregular pencillings and scratches are confined for the most part to certain sets, and on some eggs nearly all of the markings are of this hieroglyphic character, giving to such the aspect of huge blackbird's eggs.

All the eggs of any one set have about the same ground color and the same general pattern in the markings, and so endless are the styles of coloration that no two sets of a large series are exactly alike. Yet so distinctive are the details of color and form of each set that should all the eggs of a considerable series become thoroughly intermingled it would not be a difficult matter to pick out accurately the different sets.

A rather blunt pyriform is the most common outline, but the extreme reaches on the one hand to an almost perfect ellipse, and on the other to a broad and rather pointed pear shape. The average measurements of a series of 138 eggs are 2.07 inches in length by 1.45 inches in breadth. The longest egg measures 2.29 inches, and the smallest 1.90, — a variation of .39 of an inch. The widest egg is 1.54 inches, and the narrowest 1.35, — a variation of .19 of an inch. The eggs of a set are generally of about the same dimension, and outline.

The exact period of incubation I am unable to state, but it is probably eighteen or twenty days. The chick liberates itself from the shell in the usual manner by cutting it neatly into halves, and the parents at once dispose of the fragments. The first downy plumage varies from a pale yellow to a soft grayish in color, with uncertain wavy markings of brown and blackish over all the upper parts. Some of the nestlings present a generally light appearance, while others are quite dark, but all of a brood are of the same general hue, and the same pattern of coloration. These pink-footed, pale-billed little balls of down now and then remain quietly in the home nest basking in the warm sunshine, but more frequently they are no sooner dry from the egg than they start to wander. A few are content to go no further than the broad sloping sides of the nest, and there they may be seen quietly dozing or tumbling about among the stems of the rushes as they explore the intricacies of their little island. The greater number, however, put boldly out to sea and drift away with the chance breeze, their tiny paddles of little avail as they pursue their now enforced journey. A gust of wind a trifle harder than usual, or a bump against a floating reed stem, and over they go bottom-side up, only to come quickly right again, dry and fluffy as ever. Having after many failures crawled over the tiny obstruction, they sail contentedly on. Now and then they get out to sea in earnest and disappear, and are probably lost in the rough waters of the open lake. Their departure from the nests was apparently ever against the will of the old birds, and many were the scoldings and severe the punishments meted out to these venturesome offspring. A glance in the direction of some local outburst of furious cries would reveal a bevy of Gulls crowded close together, beating the air and the water over a particular spot, where on closer inspection might be seen one or more of these hapless truants. The frenzy of the old birds as the chicks neared the open lake was pitiful to behold. With might and main they endeavored to turn them back, seeming not to realize their utter inability to stem the breeze even had they the inclination to make the attempt. At last, their protests of no avail, a resort is had to still more vigorous measures, and seizing the drifting chicks by the nape of the neck with the powerful beak they are jerked

bodily and roughly out of the water, and from a height of three or four feet thrown as far as possible in the desired direction. This being repeated time and again — often several old birds taking part in the performance — until the youngsters are at last flung into some nest, exhausted and bleeding from the blows and pinches inflicted by the sharp bills of the parent birds. This strange spectacle was of common occurrence, and these vigorous nursery duties seemed to occupy much of the attention of a goodly part of the members of this colony. Probably under ordinary conditions of water and protection such disturbances are less frequent. So far as the disciplining and care of the young went there existed a curious spirit of communism among these Gulls. An old Gull cared for whatever young Gulls fell in its way, and when the stray chicks chanced to clamber up into a strange nest, against which they happened to drift, they were after a few admonishing squawks welcomed as one of the household, and scolded, pecked, and fed just as though the foster parent had laid the eggs from which they were hatched.

Now and then an entire brood would escape in a body and crawling up beside some incubating bird on a neighboring windward nest would cuddle close about the old bird, who, to all appearances, was perfectly willing to adopt them in advance of the appearance of her own infants.

Occasionally we saw old Gulls already in possession of a family twice the size to which they were entitled, rushing out and pouncing upon other fresh arrivals, who were quickly hustled and jerked up among the others until not infrequently ten or a dozen of these tiny balls filled the nest to overflowing, and in the diversity of coloration presented plainly indicated their varied parentage.

Most jealously were these foundling asylums watched over and many were the fierce encounters in mid-air that resulted when some marauding band dared to interfere. A single Gull, aided it might be by some accepted neighbor, fed apparently without distinction all these youngsters, and time and again we saw some little chap, just fished out of the water and still sore from the rough usage to which he had been subjected, fed to repletion by his captor, who disgorged into the tiny maw a juicy mass of dragon-fly nymphs brought from the meadow a mile away.

FIG. 1. A PAIR OF FRANKLIN'S GULLS WITH FOUR CHICKS.

FIG. 2. SCENE AT THE FRANKLIN'S GULL COLONY, HERON LAKE, MINN., JUNE 16, 1899.

The note of these little Gulls is a faint peep, but weak as it is, it contains a plain suggestion of the harsh scream of the adult, just as the nestling Grebe and gaudy little Coot mimic the cries of the parent.

With all this nest building, nest cleaning, and the varied parental duties devolving upon these birds of trim and delicate attire, they always appeared immaculately clean. As they stood on their nests, or hovered overhead facing the sun, the exquisite pink of the breast was plainly visible at a distance of fifty or sixty feet, and the picture they presented of dove-like beauty and grace of movement was unexcelled by anything we had seen elsewhere.

This superficial resemblance to a Dove, both when sitting and on the wing, is very great and has given rise to the popular name by which they are best known among the farmers through the region where they dwell — 'Prairie Dove.' Hovering lightly on the wing, resting buoyantly on the water, poising as they rise, or alight with upraised wings, or grouped about their nests they are the very perfection of grace and beauty and could not fail to attract the attention and elicit the admiration of the most indifferent of observers.

This colony of Franklin's Gulls had as associates and intimate neighbors many Coots, Pied-billed Grebes, Black Terns, a few Forster's Terns and, most notable of all, because so unexpected in this place, a colony of American Eared Grebes (*Colymbus nigricollis californicus*). There were a hundred or more of these latter birds and they had established themselves in the very midst of the Gull colony. Their nests, which were the very poorest structures that could be called by such a name, were disposed in two or three principal groups, were close together, and were intimately mingled with the Gulls' nests. Perhaps because they had drifted, some of them rested directly against Gulls' nests, but they had not been abandoned. The nests were partially submerged platforms of green vegetation pulled up from the bottom and were without even as much form and stability as is usually possessed by the rude structure of the Pied-billed. The eggs were half under water, and it seemed a marvel how they stayed on the loose platforms at all. They were only imperfectly covered. These Grebes, unlike their Pied-billed relatives, stayed close by their nests and for the most

part on them. When driven off they all swam rapidly away in a body and circled around at a safe distance, only to return immediately as soon as the coast was clear. In clambering up onto these frail nests they tipped and nearly sank the whole affair, but it nevertheless afforded sufficient support for them to lie for hours basking in the sun, often on one side, with the head held awkwardly up, and one leg waving clear of the water — a curious attitude, which it took us some little time to make out in detail with the aid of our glasses.

In conclusion a word may be said in regard to the food habits of Franklin's Gull. Everything goes to show that it, like most birds, eats that which is nearest at hand and easiest to get provided it is at all suited to its wants. During the nesting season at least, the food is almost exclusively insectivorous. The stomachs and gullets of several birds collected by the writer and kindly examined by Prof. Beal of the Biological Survey at Washington, contained a mass of insect débris to the exclusion of all else. One stomach alone furnished some fifteen different species, among them several varieties injurious to the interests of man. The chief part of the food, however, during the time of our visit to the colony, and that on which the young were largely fed, was the nymphs of dragon-flies which were then to be found in immense numbers in the meadows near by. The writer counted no less than three hundred and twenty-seven of these insects in a single stomach. Earlier in the season when the farmers are engaged in plowing, especially when 'breaking' the virgin prairie, many of these Gulls accompany the teams and eagerly contend with a horde of Blackbirds, Black Terns and other birds in securing the larvæ and worms turned up by the plow. Immense numbers of angleworms, and many grubs of the cockchafer, are at times devoured in this way. Later in the season when grasshoppers have become plentiful the upland prairies and dry knolls become the feeding grounds and a diet of these ill-favored insects takes the place of all else. The aquatic life that is consumed as food is taken principally very early and late in the season and is probably of such a nature that it can in no way modify the conclusion that Franklin's Rosy Gull, besides being an object of great beauty and æsthetic value, has a prosaic and practical side revealed by the nature of

the food consumed, which shows it to be an eminently useful and beneficial bird worthy of all the protection that can be afforded it.

DESCRIPTION OF PLATES.

PLATE IX.

Franklin's Gull (*Larus franklinii*), standing on nest. From photograph taken at Heron Lake, Jackson Co., Minn., June, 1899. About $\frac{1}{3}$ natural size.

PLATE X.

Fig. 1. A distant view of a portion of the nesting site of the Franklin Gull Colony at Heron Lake, Minn. From photograph, June, 1899.

Fig. 2. A pair of Franklin Gulls standing on their floating nest. One egg and a chick visible. From photograph taken at Heron Lake, Minn., June, 1899. About $\frac{1}{3}$ natural size.

PLATE XI.

Fig. 1. A pair of Franklin Gulls with four chicks, in the act of following the parents from the nest. From photographs taken at Heron Lake, June, 1899. About $\frac{1}{15}$ natural size.

Fig. 2. Scene at the Franklin Gull Colony, Heron Lake, Minn., June 16, 1899. Shows in foreground a nest containing, besides the parent birds, twelve chicks, mostly 'waifs,' rescued from the water nearby.

NOTES ON A COLLECTION OF BAHAMA BIRDS.

BY OUTRAM BANGS.

IN THE early part of the year 1893, and again in the spring and early summer of 1897, Mr. C. J. Maynard collected a great many birds on some of the Bahama Islands — chiefly at Nassau, New Providence. Many of these have been distributed, but Mr. May-

nard put aside quite a number of the more interesting specimens that have since been kept together. This collection, numbering 337 skins, has just been acquired by my brother E. A. Bangs and myself.

It includes, besides many interesting things, the types of the four forms, *Colinus bahamensis*, *Speotyto bahamensis*, *Dendroica bahamensis* and *Hæmatopus prattii*, — named last autumn by Mr. Maynard.[1] These four forms appear to me to be perfectly good, but two of the names — that for the Pine Warbler and the Burrowing Owl — used by Mr. Maynard are preoccupied, and these must receive new names.

Most of the birds were taken at Nassau, New Providence, but there are a few from some of the other islands. Many of the species are represented by young in first plumage and some by adults in the worn, faded plumage of mid-summer. A few of the skins were made by Mr. H. J. Claridge, late in the summer of 1897, and sent to Mr. Maynard after he had himself returned home.

Following is a complete list of the collection. My only excuse for giving so many common species, that have been recorded again and again, is that it may be useful to working ornithologists to know where such things can be found in series.

1. **Sterna anæthetus** *Scop.* BRIDLED TERN. — One pair of adults both taken on Booby Rocks, May 21, 1897.

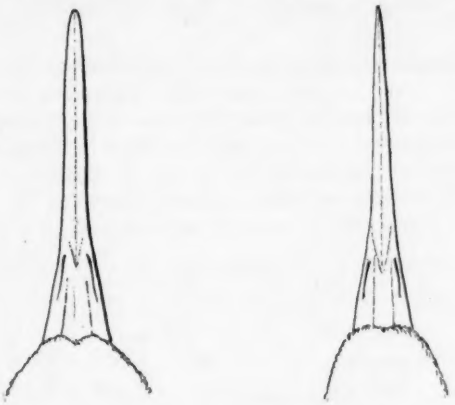
2. **Sterna dougalli** *Montag.* ROSEATE TERN. — One adult ♀ taken May 18, 1897 on North Key.

3. **Hæmatopus**[2] **prattii** *Maynard.* PRATT'S OYSTER-CATCHER. — Two specimens, cotypes of the species — a mated pair — taken April 29, 1893, on Flemmings Key, where they were about to breed. This strongly characterized species is a resident of the Bahamas, breeding locally throughout the islands. It is about the size of *H. palliatus*, but has larger, heavier tarsus and foot and a remarkably different bill; the bill of *H. prattii* being exceedingly broad and stout (see cut). *H. prattii* is paler throughout than *H. palliatus*, the brown of back lighter, the black of head and neck duller, and this latter color not extending backwards so far either above or below. I have compared the cotypes of *H. prattii* with an extensive series of skins of *H. palliatus* from many

[1] 'Appendix to Catalogue of the Birds of the West Indies.' Issued as a separate leaflet by Mr. Maynard Nov. 29, 1899. Reviewed by Dr. J. A. Allen, Auk, April, 1900, p. 187.

[2] Misspelled "*Hæmotopus*" by Maynard.

points along the south Atlantic coast of North America, chiefly in the collection of William Brewster, Esq., and cannot find a single individual



A. Bill of *Hæmatopus prattii* Maynard, adult ♂ cotype. (No. 3360, Bangs Coll.)
B. Bill of *Hæmatopus palliatus* Temm., adult ♂, from Frogmore, S. C. (No. 12492, Brewster Coll.)
Both one-half natural size.

of the continental form that even approaches them in the shape of the bill and the size of the tarsus and foot.

Measurements of H. prattii.

No.		Wing.	Tail	Tarsus.	Middle toe with claw.	Breadth of bill at middle of nostril.
3360	♂ ad. Cotype.	254.	103.	61.	49.	12.
3361	♀ ad. Cotype.	258.	105.	64.	49.	12.

4. **Ægialitis wilsonia** (*Ord*). WILSON'S PLOVER. — Two specimens, both males, one taken on Little Pimlico, April 26, 1897, one on Andros, April 30, 1893. Neither of these is true *wilsonia*, — they are both intermediates between that form and *rufinucha*, though nearer *wilsonia*.

5. **Ægialitis meloda** (*Ord*). PIPING PLOVER. — One ♀ from Current Island, Eleuthera, May 1, 1897.

6. **Ægialitis semipalmata** *Bonap.* SEMIPALMATED PLOVER. — One ♀ from Nassau, April 2, 1897.

7. **Symphemia semipalmata** (*Gmel.*). WILLET. — Four specimens, one from Current Island, Eleuthera, April 14, 1897, three from Fresh Creek, Andros, April 24, 1893.

The Willet breeds commonly on the Bahamas and these birds perhaps represent a local form. In size they are quite as small or smaller than true *S. semipalmata*, but in color they are very pale, agreeing more nearly in this respect with *S. semipalmata inornata* Brewster except that the dark spots on the under parts, though few in number, are much more distinct, and the pinkish-salmon suffusion and borders of the spots and markings usually seen in that strongly characterized form are wanting.

Measurements of S. semipalmata from the Bahamas.

No.	Sex.	Locality.	Wing.	Tail.	Tarsus.	Exposed Culmen.
3506	♂	Current Isl., Eleuthera.	195.	74.5	58.	54.
3509	♀	Fresh Creek, Andros.	194.5	76.	60.	57.
3507	♂	" "	183.	70.	54.5	51.5
3508	♀	" "	185.	69.	52.	52.

8. **Ereunetes pusillus** (*Linn.*). SEMIPALMATED SANDPIPER.—One ♂ taken May 5, 1897, at Salt Key.

9. **Tringa minutilla** *Vieill.* LEAST SANDPIPER.—One ♀, Salt Key, May 5, 1897.

10. **Colinus bahamensis** *Maynard.* NASSAU BOB-WHITE. — Three specimens, all from Nassau, the cotypes of the species, which are a ♂ taken May 11, 1897, a ♀ taken April 1, 1897,[1] and another male taken June 2, 1897.

The Nassau Bob-white is a slightly differentiated island form, differing from *C. virginianus floridanus*, as Mr. Maynard has pointed out, in the narrowness of the black markings below, and the greater tendency of the markings to be arrow-shaped.

11. **Columbigallina bahamensis** *Maynard.* BAHAMA GROUND DOVE. —Twenty-two specimens, all from Nassau except one, an adult ♀, from Current Island, Eleuthera. This series includes birds taken from February to July, and five young in different stages of plumage.

12. **Zenaida zenaida** (*Bonap.*). ZENAIDA DOVE.—Two males from Nassau, May 24 and July 13, 1897.

13. **Zenaidura macroura** (*Linn.*). MOURNING DOVE. — Four skins, two males, two females, taken at Nassau, April 2 and 3, 1897.

[1] The cotypes are now Nos. 3356, ♂, and 3357, ♀, Coll. of E. A. and O. Bangs.

14. **Ardea bahamensis** *Brewster.* BREWSTER'S GREEN HERON.— One adult ♂ from Nassau, May 7, 1897.

15. **Speotyto cunicularia cavicola,** nom. nov. BAHAMAN BURROWING OWL.

Speotyto bahamensis Maynard; not *Speotyto cunicularia bahamensis* Cory, Auk, October, 1891, p. 349.

In my opinion the form of the Burrowing Owl found on the more northern Bahamas should be separated from the Florida form with which Cory unites it in his review of the group. Evidently Maynard overlooked Cory's review of the West Indian forms, as he not only did not mention that paper, but gave the New Providence bird the name Cory had used for the form found on Inagua.

The type of *S. cunicularia cavicola* (No. 3359, Collection of E. A. and O. Bangs) is an adult ♀ taken at Nassau April 6, 1897, by Mr. Maynard, with a set of six eggs. The nest was in a deep hole in the limestone rock. This skin, compared with an adult ♀ of *S. cunicularia floridana* from Manatee County, Florida, taken April 5, and therefore strictly comparable, shows the following differences. The Nassau bird is slightly larger, with heavier foot and tarsus; tarsus thickly feathered above; general coloration richer and redder brown; ground color below buffy, not white; the brown of back and the brown marking and spotting below Prout's brown (sepia in *S. c. floridana*).

The type of *S. cunicularia cavicola*, ♀ adult, measures, wing, 171.; tail, 76.; tarsus, 48.; middle toe, without claw, 21.; depth of bill, 13.2 mm.

An adult ♀ of *S. cunicularia floridana* from Manatee County, Florida, No. 884, Bangs collection, measures, wing, 161.5; tail, 63; tarsus, 44; middle toe without claw, 19; depth of bill, 12.4 mm.

16. **Strix pratincola** *Bonap.* AMERICAN BARN OWL. — Two specimens, — a pair of adults — taken August 4, 1897, by H. J. Claridge at Nassau. In order to settle the question of the identity of the Bahama Barn Owl, I sent these two skins to Dr. Ridgway, who kindly compared them for me with the large series in Washington. He wrote me as follows: "We can match your two Bahama specimens exactly with some in our series from Washington, Arizona, etc.; we also have a Bahama skin, very much resembling yours. The Cuban form (*S. furcata*) is almost precisely like these Bahaman and occasional North American specimens except that they always have conspicuously light-colored (sometimes white) secondaries, contrasting strongly with the general color of the wing."

The Bahaman bird can therefore safely be called *pratincola*, although it appears to differ a little from the usual style of coloration of the continental form, this difference being in the direction of the Cuban *S. furcata*.

17. **Crotophaga ani** *Linn.* ANI. — Ten adults, from Nassau, Current Island, Eleuthera, and Andros Island, taken from April 14 to July 28.

18. **Saurothera bahamensis** *Bryant.* BAHAMA CUCKOO. — Ten specimens, all from Nassau. This series includes adults in fresh plumage and in worn mid-summer dress, taken on dates ranging from February 13 to July 25, besides three young specimens in nestling plumage taken June 19, July 2 and July 7. The young differ from the adults only in having the throat and breast a little paler in tone, and in entirely lacking the black bars in the tail.

19. **Coccyzus minor maynardi** *Ridgw.* MAYNARD'S COOKOO. — Nine specimens, all from Nassau, including adults taken in June, July and August, and one nestling taken June 23, 1897. The nestling plumage appears to differ from that of the adult chiefly in the coloring of the tail, the four outer rectrices in the young bird not being distinctly black basally, but dull dusky brown with the white ends less purely white and deeper.

20. **Dryobates maynardi** (*Ridgw.*). MAYNARD'S WOODPECKER. — Ten specimens, all from Nassau, adults, taken from February 12 to August 22, and two nestlings, ♂ and ♀, taken respectively June 10, and June 11, 1897. The nestlings show the character that separates this island form from the mainland Hairy Woodpecker — the white lores connecting the superciliary stripe with the whitish nasal tufts — quite as strongly as do the adults.

21. **Chordeiles minor** *Cab.* LITTLE NIGHTHAWK. — One ♀, taken at Nassau, May 13, 1897.

22. **Doricha evelynæ** (*Bourc.*). BAHAMA WOODSTAR. — Ten specimens — eight from Nassau, two from Current Island, Eleuthera.

23. **Pitangus bahamensis** *Bryant.* BAHAMA KINGBIRD. — Two males from Nassau, March 2 and June 3, 1897.

24. **Blacicus bahamensis** (*Bryant*). LEAST BAHAMA FLYCATCHER. — Ten specimens, all from Nassau, adults, taken from March 6 to June 19, and one nestling taken May 24, 1897.

25. **Myiarchus leucaysiensis** *Bryant.* RUFOUS-TAILED FLYCATCHER. — Five specimens, from Nassau, March 10 to June 24.

26. **Tyrannus dominicensis** (*Gmel.*). GRAY KINGBIRD. — Six specimens, from Nassau, May and June.

27. **Callichelidon cyaneoviridis** (*Bryant*). BAHAMA SWALLOW.—Eight specimens, seven males, from Nassau, all taken on March 8, 1897; one ♀ from Current Island, Eleuthera, April 24, 1897.

28. **Vireo calidris barbatulus** (*Cab.*). BLACK-WHISKERED VIREO. — Thirty-one specimens, all from Nassau but one, which was taken on Current Island, Eleuthera, April 30, 1897. The Nassau examples were taken in May, June and July.

Mr. J. Lewis Bonhote in reporting on a small collection made by himself on New Providence,[1] calls his specimens true *calidris*; to this I can not agree.

[1] Ibis, October, 1899, pp. 511–512.

The bird goes through a curious change in color, during the summer, without molt. In early May (10th to 15th) it is in fine plumage with green back and gray pileum; gradually as the season advances the gray color fades to a rusty brown which in July specimens covers the whole pileum and sides of head and neck and spreads over the back nearly to the rump.

29. **Vireo crassirostris** *Bryant.* THICK-BILLED VIREO. — Twenty-one specimens, all from Nassau, adults taken in February, March, April and May, and four nestlings taken June 24 and 25.

This series shows a wide range in color, from very dull colored examples to some nearly as bright as *V. crassirostris flavescens*, though none are quite as highly colored as that form. Dr. Ridgway kindly compared this series with the type of *V. crassirostris*, which is in the National Museum, and wrote me that it (the type) is about half way between the dullest and brightest individuals in our series.

30. **Mimus gundlachii** (*Cab.*). GUNDLACH'S MOCKINGBIRD. — Ten specimens, six from Nassau, four from Highbourne Key, March and April.

31. **Galeoscoptes carolinensis** (*Linn.*). CATBIRD.—One adult ♂ from Nassau, March 4, 1897.

32. **Mimocichla plumbea** (*Linn.*). PLUMBEUS MOCKINGBIRD. — Ten specimens, all from Nassau, including adults taken from February 8 to March 24, and two young examples in nestling plumage taken August 15 and August 20, 1897.

The nestlings have the throat thickly spotted with dusky and the rest of the underparts sparsely spotted with dusky brown; the wing-coverts somewhat spotted with light brown.

33. **Polioptila cærulea cæsiogaster** (*Ridgw.*). BAHAMA GNATCATCHER. —Seven adults from Nassau.

34. **Geothlypis trichas** (*Linn.*). MARYLAND YELLOW-THROAT. — Six specimens from Nassau and Current Island, Eleuthera, taken from Feb. 8 to April 13.

35. **Geothlypis restricta.** *Maynard.*[1] BAHAMA YELLOW-THROAT. — Eight specimens, from Nassau, Hog Island and Salt Key, February 8 to May 5.

I use this name for the smaller Yellowthroat that winters on the Bahamas; it certainly is a different form from *G. trichas*, and some day its breeding range will be known.

When Mr. Maynard described this form he believed that it bred on New Providence; since then he has ascertained that it does not breed on that island, at least, though it lingers very late, — into early May. Besides the differences in color and extent of the black markings, *G. restricta* averages smaller than *G. trichas*. (The wing of *G. trichas*, in a very large series I have just measured, runs from 55 mm. to 59 mm. In the

[1] *Geothlypis restricta* Maynard, American Exchange and Mart, December 15, 1886.

series of eight examples of *G. restricta* the wing measures from 53 mm. to 55 mm.)

36. **Geothlypis rostrata** *Bryant.* GREATER YELLOW-THROAT.— Eleven specimens, ten males, one female, taken from February 6 to June 27, 1897, at Nassau.

It has always been supposed that the large Yellow-throats of the Bahamas were representative island forms, — *G. rostrata* on New Providence, *G. coryi* on Eleuthera, *G. tanneri* on Abaco, and a form as yet undescribed on Andros.[1] It is therefore a great surprise to find that *two species breed on New Providence*, and one other, *G. coryi*, has been taken there once, though it was probably only a straggler. It is to Mr. Maynard's great acuteness as a collector that this unlooked for discovery is due. Mr. Maynard has taken these skulking, retiring birds in larger numbers than any one else who has visited the Bahamas. While collecting them in 1897 at Nassau he noticed two different songs, and making notes on the birds he shot, soon found that two distinct species were breeding equally commonly there. The smaller, duller colored bird, *G. rostrata*, sings like a Maryland Yellow-throat. The larger, more highly colored species, sings like *G. coryi*, — a song so different that Mr. Maynard says, no one on first hearing it would take it for the performance of a Yellow-throat.

37. **Geothlypis maynardi,**[2] sp. nov. MAYNARD'S YELLOW-THROAT. — Thirteen adult males from Nassau, New Providence, taken from February 8 to June 24, 1897.

Type, from Nassau, New Providence, No. 3363, ♂ adult, collection of E. A. and O. Bangs, collected May 11, 1897, by C. J. Maynard.

General characters.—Most nearly like *G. coryi*, differing from that species in having the black mask bordered behind by ash-gray, becoming paler and more yellowish behind the eye, the occiput dark ash, and the upper parts dull olive green more nearly as in *G. rostrata;* can be told from *G. rostrata*, with which it occurs, by larger size and much brighter colors, the whole underparts being bright yellow. In *G. rostrata* the throat and breast are pale yellow, the belly whitish and the flanks and sides dull brownish green. Song wholly different from that of *G. rostrata.*

Color.—Adult ♂ (♀ unknown) with black mask about as in the allied forms, bordered behind by ash-gray which becomes yellowish ash from behind the eye downwards; occiput dark ash, many of the feathers bordered by olivaceous; rest of upper parts, including the edges of the wing feathers and the tail, dull olive-green; whole under parts bright gamboge yellow, the sides slightly more olivaceous.

Remarks.—Dr. Ridgway kindly compared our series of Yellow-throats for me with the material at Washington. This was a necessity, as the

[1] See Allen's note after *Geothlypis rostrata* of Northrop's list, Auk, January, 1891, pp. 68–69.

[2] Named in honor of C. J. Maynard.

type of Bryant's *G. rostrata* is in the National Museum, and of course the question arose, as to which of the two species breeding on New Providence Bryant's name applied. *G. rostrata* proves to be the smaller, duller colored bird.

Measurements of G. rostrata Bryant.

No.		Sex.	Wing.	Tail.	Tarsus.	Exposed culmen.
3377	Topotype	♂	61.	56.	22.	16.
3378	"	♂	62.5	59.	22.	16.
3379	"	♂	62.5	59.	22.2	17.
3380	"	♂	60.[1]	55.5	21.8	16.
3381	"	♂	64.	59.	22.2	16.2
3382	"	♂	61.5	57.5	21.6	16.
3383	"	♂	62.	58.	22.	16.
3384	"	♂	62.	56.5	21.6	16.
3385	"	♂	62.5	57.5	21.4	16.2
3386	"	♂	61.5	56.5	22.	17.
3375	"	♀	59.	53.	21.	15.8

Measurements of G. maynardi Bangs.

No.		Sex.	Wing.	Tail.	Tarsus.	Exposed culmen.
3362	Topotype	♂	66.	57.	22.2	16.2
3363	Type	♂	66.	61.	22.2	16.
3364	Topotype	♂	65.	60.	21.8	15.8
3365	"	♂	66.	60.	22.	16.
3366	"	♂	65.5	59.	21.6	16.
3367	"	♂	66.	60.	22.	16.2
3368	"	♂	65.	57.	22.	16.
3369	"	♂	64.	58.	23.	16.8
3370	"	♂	64.	58.	22.4	17.
3371	"	♂	66.5	57.	22.	16.2
3372	"	♂	65.5	57.5	23.	16.
3373	"	♂	66.5	58.	22.2	16.

[1] Wing somewhat worn, the measurement, therefore, is a little too short.

38. **Geothlypis coryi** *Ridgw.* CORY'S YELLOW-THROAT.—One adult ♂ taken July 7, 1897, by H. J. Claridge at Nassau. This specimen is without any doubt *G. coryi.* Taken so late in the summer, after the breeding season, it is probably a straggler, that in some way wandered over from Eleuthera. Dr. Ridgway has seen the skin and agrees with me that it is certainly *G. coryi.*

39. **Seiurus aurocapillus** (*Linn.*). OVEN-BIRD.—One ♀ from Nassau, February 6, 1897.

40. **Dendroica tigrina** (*Gmel.*). CAPE MAY WARBLER.—Ten specimens, one from Nassau, and nine from Current Island, Eleuthera, taken from April 20 to April 27.

41. **Dendroica petechia flavivertex** *Chapman.* CHAPMAN'S WARBLER.—One adult ♂ from Nassau, May 7, 1897.

42. **Dendroica kirtlandi** *Baird.* KIRTLAND'S WARBLER.—A pair of adults, ♂ taken April 5, ♀ March 4, 1897, both at Nassau.

43. **Dendroica achrustera,**[1] nom. nov. BAHAMA PINE WARBLER.

Dendroica bahamensis Maynard, not *Dendroica pityophila bahamensis* Cory, Auk, October, 1891, p. 348.

Five specimens, including the cotypes of the species, a mated pair taken March 6; an adult ♀ taken March 20; an adult ♂ taken March 24; a young, in nestling plumage, taken May 28,—all at Nassau.

The New Providence Pine Warbler is a very distinct island form. The adult ♂ differs from the adult ♂ of *D. vigorsii* in having the throat and breast pale yellow (about pale lemon yellow); belly and under tail-coverts soiled white; flanks and sides brownish; the upper parts much duller—more brownish, less greenish. The adult ♀ differs from the adult ♀ of *D. vigorsii* in being much duller and browner below with very little yellow on throat and this of a very pale shade; upper parts dull olive brown instead of greenish.

The nestling differs from any nestlings of *D. vigorsii* I have seen, in having the back a color very near cinnamon-rufous (this region in nestlings of *D. vigorsii* being, usually, about sepia).

D. achrustera is a smaller bird than *D. vigorsii*, as shown by the following measurements:

Measurements of D. achrustera Bangs.

No.		Sex.	Wing.	Tail.	Tarsus.	Culmen.
3351	Cotype	♂ ad.	64.	52.	18.4	12.
3353	Topotype	♂ ad.	64.	53.	18.4	12.2
3352	Cotype	♀ ad.	63.	51.	18.6	11.4
3354	Topotype	♀ ad.	62.5	50.	18.6	12.

In adult males of *D. vigorsii* I find the wing measures not less than 70 mm. and often exceeds this by several mm.

44. **Dendroica palmarum** (*Gmel.*). PALM WARBLER.—One ♂, Nassau, April 26, 1897, a late date for this species.

[1] Αχρούστερα=less highly colored.

45. **Dendroica discolor** (*Vieill.*). PRAIRIE WARBLER. — Five specimens, from Nassau, Sandy Key and Current Island, Eleuthera, February 25, March 24 and April 20.

46. **Cœreba bahamensis** (*Reich.*). BAHAMA HONEY CREEPER. — Twelve specimens, seven adults from Nassau, an adult ♂ and two nestlings from Current Island, Eleuthera — the adult taken April 22, and the young April 20 and April 27 — and two adult males from Highbourne Key, April 8.

47. **Spindalis zena** (*Linn.*). BAHAMA FRUIT FINCH. — Nineteen specimens, all from Nassau, taken from February 12 to June 24.

48. **Euetheia bicolor** (*Linn.*). GRASSQUIT. — Ten specimens, all from Nassau; adults taken from February 6 to June 7, and one nestling taken June 16.

49. **Pyrrhulagra violacea** (*Linn.*). PURPLE GROSBEAK. — Sixteen specimens from Nassau, Current Island, Eleuthera, and Highbourne Key, taken from February 12 to July 1.

50. **Passerculus sandwichensis savanna** (*Wils.*). SAVANNA SPARROW. — Three specimens from Nassau, taken March 3 and April 1, 1897,

51. **Agelaius bryanti** (*Ridgw.*). BAHAMA RED-WING. — One adult ♂. taken at Fresh Creek, Andros, May, 1897.

GENERAL NOTES.

The Red-necked Grebe in Michigan in Winter. — On the 12th of this month (March, 1900) a fine female specimen of the Red-necked Grebe (*Colymbus holbœllii*) was picked up in a frozen condition on a lake two and one half miles west of this city. In skinning it I found that one of the radii had been fractured by a shot. The wound had healed externally and the bone had fused, showing that it had been injured before the winter set in and had been unable to take its departure, as it otherwise would have done, and this accounts for its presence at such an unusual period. This bird is of very rare occurrence in Michigan. It is now in my collection. — PERCY S. SELOUS, *Greenville, Mich.*

The Dovekie (*Alle alle*) on the Coast of Virginia. — Two Dovekies (*Alle alle*) were shot from a blind Dec. 13, 1899, about one mile west of Killick Shoal Light, in Chincoteaque Bay, Virginia, by Wm. H. Cookman of Germantown, Philadelphia. The birds were positively identified and it was stated by R. T. Taylor, a resident gunner during the past twenty years, that he had never seen any birds like them before in that locality. There were four birds in the flock. — WM. L. BAILY, *Ardmore, Pa.*

The American Egret in Connecticut. — On the 28th of July, 1899, a fine specimen of the American Egret, *Ardea egretta*, was brought me, having just been shot from a tree on the shore of a small pond in this town, Kent. As the person in question passed near the pond, the great white bird flew up from the shore, alighted on a low tree close by, remaining until he returned from the house with a gun, and manifesting no shyness. It was a male, but whether old or young I could not decide, as, though without plumes or long feathers, it was of full measurements, and showed no lingering adolescence. This occurrence, forty miles inland, is probably much more unusual than the appearance of this species on Long Island Sound. — Rev. Herbert K. Job, *Kent, Conn.*

Notes on the Nesting of the Blue-throated Hummingbird. — On February 16, 1899, while at a place called Las Minas, which is about five miles north of Las Vigas, Vera Cruz, Mexico, I found the nest of a Blue-throated Hummingbird (*Cœligena clemenciæ*). The place was in a cañon and the elevation was about 4500 feet.

On February 12 we had snow, with thermometer down to 32° F. at 4 p. m., and on February 13, at 7 a. m., down to 29° F. All the plants and trees were covered with ice, and the leaves of almost everything were killed; we found many frozen birds, and that was the fate of the owner of this nest. We only had two cold days, but that was enough to destroy many birds.

The nest was fastened to a vine one tenth of an inch in diameter and about three feet above a small stream of water. The vine hung from a large rock and the nest was one and a half feet from the rock, and would have been sheltered from rain by the overhanging rock. The nest is of bulky structure, and is perhaps a new nest built on top of an old one. It is composed of fine moss massed together, and bound with spiders' webs or similar material. It measures, outer diameter, 2¾ inches, depth 4 inches; inside diameter, 1¼ inches; depth, ¾ inch. There is very little lining, only enough for the eggs to rest on, consisting of down from some fern.

The two dull white eggs, elliptical oval in shape, measure .61×.35 and .62×.40 inch. The nest and eggs are now at the Smithsonian Institution. — Josiah H. Clark, *Paterson, N. J.*

Evening Grosbeak (*Coccothraustes vespertinus*). — This beautiful and dignified looking bird was exceedingly common in the city of Milwaukee, during the months of February and March, as many as thirty and forty often being seen in one flock. They frequented the box elder trees, which were covered with an unusual supply of seeds even in the densely populated parts of the city. One morning — the thermometer registered 20° below zero — while walking down Cedar Street I found the whole sidewalk underneath a fine old box elder covered with the broken parts

of the seeds. Almost at the same moment I heard a soft and very melodious *cheep*, and on looking up into the tree I beheld a flock of thirty-nine of these strangely beautiful birds. They were very silent and quite unsuspicious. Only now and then a soft *cheep-cheep* was uttered by one or the other of the party. When they were alarmed they uttered a rather sharp and quick *chip* and then all took wing. One morning I found a few on a mountain ash where they evidently were feeding on the seeds of the dry fruit. They were only seen early in the morning, never later in the day. In the West Park, a place where the birds are always protected, they were rather abundant during the months mentioned. — H. NEHRLING, *Milwaukee, Wisc.*

Feeding Habits of the Pine Siskin. — Mrs. W. C. Horton, president of the Brattleboro, Vt., Bird Club (a branch of the American Society of Bird Restorers), and a member of this Society's patrol, reports that on April 14 of this year, Pine Siskins (*Spinus pinus*) were observed feeding on the seeds of cones in a pine grove near her Brattleboro home. Two young Siskins were also noted, apparently just out of the nest. These youngsters were assiduously fed by at least one of the parents, but with *what* was not clear. Several feedings occurred and between them the parent procured no visible supply of food. To the observers it seemed highly probable that the feeding was done by regurgitation. — FLETCHER OSGOOD, *Boston, Mass.*

Large Flight of White-winged Crossbills on Long Island, N. Y. — The Red Crossbills, *Loxia curvirostra minor*, are more or less regular in their appearance on Long Island each year and occasionally breed there, but the presence of the White-winged Crossbill, *Loxia leucoptera*, is of such rare occurrence, that I consider their appearance in such large numbers during the past fall and winter worthy of note.

Capt. James G. Scott presented me with a fine adult male of this species that he shot on the 7th of November from a flock of seven or eight at Montauk Point, L. I. The next evidence of their presence that came to my notice was on the 20th of November, when I met with them in large numbers. Between Mount Sinai Harbor and Long Island is a long strip of beach and low sand ridges; on the harbor side these are covered with a scattering growth of bushes and dwarfed red cedars. The hills on the eastern side of the harbor are covered with a thick growth of red cedars, and it was in this vicinity that most of the birds were noticed. There was a strong northwest wind blowing at the time and the birds were flying very low, many of them just clearing the tops of the trees and bushes. Most of the birds were noticed between 9 A. M. and 12 M. During this time thousands of Pine Finches, Goldfinches and White-winged Crossbills were passing westward, occasionally in mixed flocks, but each species appearing to keep in groups by themselves. Between the hours men-

tioned there was an almost continuous succession of flocks containing from three or four to as many as one hundred and fifty or two hundred birds in a flock. Their notes, quite unlike those of their red cousins, remind one more of the twittering notes which the Pine Finch utters when feeding. Two or three flocks of Red Crossbills were also noted.

November 21, I again visited the same locality and several hundred 'White-wings' were seen, but very few compared to the numbers seen on the previous day, and all were flying very high. On both days they appeared to be very restless, and when called down would alight in the tops of the cedars. After picking for a moment or two as if in search of food and finding none they would at once resume their journey westward across the harbor. Sixteen specimens were examined and all were in good flesh; their stomachs contained only a little sand and traces of vegetable matter. All of those seen appeared to be adults except one female taken, whose skull indicated immaturity. The red males appeared to be the more numerous.

November 22 again found me in the same locality, but only a single 'White-wing' was seen, this was in company with a flock of Goldfinches. On several occasions from this time on until the 20th of February, when I left Millers Place, single birds or a small flock would be seen, but I think very few spent the winter on the island.

The Red Crossbills (*Loxia curvirostra minor*) were also more numerous than usual during the past winter, and I think a few remained and bred on the island. May 6, two small flocks were noticed among the pitch pines south of Millers Place, one flock of six containing five red males and one female. The following day I procured a female in worn plumage, whose ovaries indicated that they had recently been in an active state. — ARTHUR H. HELME, *Brooklyn, N. Y.*

The Lark Finch and Baird's Bunting on Long Island, N. Y. — An adult male Lark Finch, *Chondestes grammacus* was taken at Millers Place, Long Island, Nov. 27, 1899. It was first noticed feeding in a clump of rag-weeds in company with a small mixed flock of Song, Fox and Tree Sparrows.

At Montauk Point, L. I., Nov. 13, 1899, I secured a small Sparrow that proves to be *Ammodramus bairdi*. The sex I was unable to determine, as it was too badly injured by shot. Dr. Jonathan Dwight, Jr., who has examined the specimen, writes me that it is "chiefly in juvenal plumage passing to first winter." So far as I am aware this is the first instance of its occurrence that has been reported from the Atlantic coast. — ARTHUR H. HELME, *Brooklyn, N. Y.*

Bachman's Sparrow in Virginia. — In May, 1897, I took a pair of Bachman's Sparrows (*Peucæa æstivalis bachmanii*) on Blackwater Creek, Campbell County, Va., together with their nest and eggs. This was the

first record of the occurrence of the species so far north, the other record being the specimen recorded from Maryland by Mr. Figgins.

I have recently learned that the species is a common summer resident in Albermarle County, Va., where Mr. Rufus Barringer, of Charlottesville, took several birds and their nests and eggs last summer. It seems now that the species is a fairly common summer resident in the State. No doubt it will be found nesting abundantly in southeastern Virginia if the proper territory is searched. But already its status as a Virginian summer resident is well established, first by my record, and now by Mr. Barringer's 'take.' — JOHN W. DANIEL, JR., *Lynchburg, Va.*

Louisiana and Mississippi Bird Notes. — On March 19, 1898, while on a collecting trip in Jefferson Parish, across the Mississippi from New Orleans, I noticed what seemed to be a dull-looking Finch in the upper branches of a small tree, feeding on the buds. I shot it, and was astonished to find it a young male Louisiana Tanager (*Piranga ludoviciana*). It was in rather dull, but not worn, plumage, and the adult red was beginning to show on the loral and mental regions. Besides being so far from its usual course of migration, it was very early, April 2, being the earliest date for the arrival of either of our other Tanagers, *Piranga rubra* putting in its appearance on that date in 1898.

On a collecting trip in Amite County, Miss., my brother, W. B. Allison, and myself, saw several Thrushes on Sept. 18, 1897, that we took for *Hylocichla fuscescens*; two specimens were secured, but, owing to bad condition of the birds, and to lack of time, only one was skinned. Two of the birds were seen the following day.

The specimen in question was recently identified by Dr. Fisher as *Hylocichla fuscescens salicicola*; this greatly extends the range of this subspecies, and the fact that more than one was seen lends additional importance to the record.

Rowing across the bay in front of Bay St. Louis, Miss., on May 11, 1899, I was very much surprised to see a Loon (*Gavia imber*), sitting on the water a few hundred yards distant. I was at first rather loth to believe that this species could be on the Gulf Coast so early in the season; but the bird remained all through the fall, and I frequently watched it, and heard its unmistakable, weird laugh. As nearly as I could tell, it was a young male.

On August 23, of the same year, I saw two Black-bellied Plovers (*Charadrius squatarola*), feeding singly, together, or with Spotted Sandpipers (*Actitis macularia*), at different times of the day. There is nothing remarkable about the fact that the Plovers were there, but the most interesting thing was that both, which finally flew by me within thirty or forty feet, were in *full black-bellied plumage*, showing that, unless by color change and not molt, the black does not pass away in the fall specimens. — ANDREW ALLISON, *New Orleans, La.*

Seven New Birds for Colorado. — Gavia arctica. BLACK-THROATED LOON. — Three small Loons were observed on Prospect Lake in the suburbs of Colorado Springs in November, 1898, and all were shot by a local gunner. One which I subsequently examined proved to be of this species. I also examined in 1883 a specimen killed, I think, the previous fall near Colorado Springs. Colorado is within the probable winter range of the species and it may be a regular visitant.

Ardea egretta. AMERICAN EGRET. — On May 12, Mr. A. Gruber and Mr. F. Cikauck, taxidermists in my employ, reported seeing a single bird in a tall cottonwood tree five miles south of Colorado Springs. As they are familiar with this species, as well as with the more common *A. candidissima*, there appears no reason to doubt their identification.

Syrnium nebulosum. — BARRED OWL. In March, 1897, Mr. B. G. Voight found a pair of these Owls breeding near Holyoke, in the northeastern corner of the State. Two eggs somewhat incubated and one of the birds were secured.

Astragalinus tristis pallidus. WESTERN GOLDFINCH. — This paler Western Goldfinch occurs in Colorado as well as the typical eastern form, to which all have heretofore been referred.

I am not able at present to define their relative range or abundance with certainty. *Pallidus* is an early spring migrant along the eastern base of the mountains and quite likely may be the alpine breeder. *Tristis* probably is a summer visitant from the southeast, occupying the plains to the base of the mountains. I have obtained both forms at Colorado Springs, and *tristis* one hundred miles eastward. Examples of both forms which I recently sent to the American Museum of Natural History, have been kindly identified by Mr. Chapman with the concurrence of Dr. Allen.

Geothlypis agilis. CONNECTICUT WARBLER. — On May 24, 1899, I shot a male in a clump of willows bordering a water hole at Lake, Lincoln County, about eighty miles northeast of Colorado Springs. This unexpected capture adds an interesting eastern bird to the fauna of Colorado, and extends the known range of the species several hundred miles to the westward.

Geothlypis trichas. MARYLAND YELLOW-THROAT. — The Yellowthroats of Colorado exhibit a great range of variation. The majority are clearly *occidentalis* but among the later arrivals are some that are nearer typical *trichas*. A male collected at Colorado Springs May 31, 1898, which I submitted to Mr. Ridgway he refers to this form.

Wilsonia canadensis. CANADIAN WARBLER. — The range of this species is extended westward nearly to the Rocky Mountain Range by my capture of a male at Lake, Lincoln County, May 23, 1899. — CHARLES E. AIKEN, *Colorado Springs, Col.*

Bird Notes from Sao Paulo, Brazil. — Mr. Adolph Hempel, assistant curator of the Museu Paulista, Sao Paulo, Brazil, a young American

naturalist, in a private letter speaks about the rural bird life of his locality as follows:

"The Canario of the Brazilians, *Sycalis floveola* Pelz., is found in this State. Right near Sao Paulo it is rare. Indeed nearly all the birds are killed by the Italians, who use them as food, and it is difficult to find a dozen species near the city. In the country, however, and especially about the farms and buildings the Canario is quite common.

The two commonest birds about Sao Paulo are *Troglodytes furvus* Wied (Curruira), and *Zonotrichia pileata* Pelz. (Tico-tico). On the farms one also finds *Sycalis flaveola*, *Turdus leucomelas* Vieill. (Sabiá), *Mimus* spec., *Milvulus tyrannus* (L.) (Tesoura), *Pitangus sulphuratus* (L.) (Bemtevi), usually one or two Woodpeckers, occasionally a Tucano, and often several species of Paroquets and Parrots, such as *Psittacula passerina* (L.), the Tuim; *Brotogerys tirica* (Gm.), the Periquito; *Pionus maximiliani* (Kuhl.), the Maitacca.

"A person who is accustomed to the variety of bird forms in the northern woods is struck with the absence of birds in the Brazilian forest, and yet many birds abound, for over five hundred species are recorded from the State of Sao Paulo alone. But the birds seem to be more solitary here. They do not sing and chatter at daybreak as they do in the United States. I have been in camp in the virgin forest, ten miles away from any house, and have not heard a note of a bird all day. One bird, however, the Tangara, *Chiroxiphia caudata* (Shaw), a beautiful small bird of blue plumage and red head, will congregate in numbers, especially during the mating season, and sing and hop and dance for hours at a time. I have often enjoyed watching them and listening to their songs." — H. NEHRLING, *Milwaukee, Wisc.*

Sanitary Habits of Birds. — I read, in the April Auk, Mr. F. H. Herrick's article on the sanitary habits of birds and was much pleased and profited by it. I was disappointed in one respect only — that was that it did not throw any confirmatory light upon a recent observation of my own which had puzzled me a little.

Late last summer I was watching a pair of Baltimore Orioles feeding their young, when I saw the male take a soft white pellicle from the open and extended mouth of a nestling, and drop it some yards from the nest.

This was new procedure to me, and I began at once to review the subject of feeding habits, as it was noted in my scant library, but I could find nothing about it. While I was about to doubt my own eyes (at thirty feet through a good opera glass) I received a letter from Mr. H. B. Rugg, of Vermont, saying that some friends of his had been watching some Robins as they fed their young, and had seen the parents take some round white substance from the throats of the nestlings; and they wanted him to tell them what this was. Then he wrote and asked me what it was.

It seemed quite a coincidence that he should pass this query on to me just when I was suffering for similar information, but it confirmed my observation. Since it is well known that pellets of indigestible things are frequently thrown up by some young birds, the best that I could suggest was that this might be these same things, which, in regurgitation, had taken on the form of the usual dejections; but not being able to see any of these pellicles after they were dropped, I, of course, could not be sure. Cannot Mr. Herrick, or some close student of the habits of birds tell us something of *this?*

I had hoped to observe further before mentioning this, but my opportunities are very limited: so I concluded that I had better note it in the July 'Auk,' so that the host of nest watchers this season may, if they please, be on the lookout for the matter. So far this year I have seen nothing of the sort in casually watching two nests of Robins in my yard.

By the way, the male Oriole noted sometimes regurgitated food to the young, but the mother always came with a particle showing in her mouth. Mr. Herrick's observation that the parent ate the dejected pellicle was new and interesting to me; for, on the contrary, I have seen the Cardinal and others assiduously wipe the beak on a twig, as if the performance had been disagreeable; but then this occurs after food is taken, as well. I have noticed that the little Social Sparrows (Hair-bird) may have one place of deposit for the pellicles. For one brood they used the dead limbs of a plum tree exclusively, and none was ever dropped on the way.

There is a large field here for further observation. Let us hope for more of this, and for something further on this special topic. — JAMES NEWTON BASKETT, *Mexico, Mo.*

RECENT LITERATURE.

Rothschild and Hartert's 'Review of the Ornithology of the Galapagos Islands.'[1] — The Galapagos Islands have come to be ornithologically classic ground in consequence of the numerous special papers that have appeared upon the birds of this exceedingly interesting archipelago. In

[1] A Review of the Ornithology of the Galapagos Islands. With Notes on the Webster-Harris Expedition. By Hon. Walter Rothschild, Ph.D., and Ernst Hartert. Novitates Zoologicæ, Vol. VI, pp. 85–205, pll. v and vi. August, 1899.

1837 John Gould published a paper on the Ground Finches collected there by Darwin on his famous voyage; in 1870 Sclater and Salvin published a paper on Dr. Habel's collection of Galapagos birds, followed in 1876 by Salvin's special memoir 'On the Avifauna of the Galapagos Archipelago'; in 1871 Mr. Ridgway published the final results of his work on the Baur and Adams collection; and we have in the present memoir a report on the Webster-Harris collection, made in 1897.

The Webster-Harris expedition was suggested to Mr. Frank B. Webster of Hyde Park, Mass., by Mr. Rothschild "towards the end of 1896," and the expedition set out in March, 1897, "under the command of Mr. Charles Miller Harris as chief naturalist and Mr. S. A. Robinson as sailing master, Messrs. James Cornell, O. E. Bullock, and George Nelson as collectors." The party went to Colon with the intention of there chartering a suitable vessel for the cruise. While there Robinson, Cornell, and Bullock "contracted yellow fever and died, partly at Colon, and partly on their voyage" to San Francisco, where Nelson gave up the trip and returned home. Here Mr. Harris, after some delay, chartered the two-masted schooner 'Lila and Mattie,' and secured Messrs. R. H. Beck, F. P. Drowne, and C. D. Hull as collectors. The original plan of making extensive collections at Guadalupe Island in the Revillagigedo Group, and at Cocos Island had to be abandoned, owing to the unfortunate delay in starting, only a short stay being made at Clarion Island, on the way to the Galapagos. The party left San Francisco June 21, 1897, sighting Clarion Island July 2, where a couple of days were spent collecting; leaving Clarion Island July 4, the party reached Culpepper Island, Galapagos, July 26, where work was carried on continuously till Dec. 28, the islands of practically the whole group being visited, and San Francisco was reached, on the return trip, Feb. 8, 1898.

The diaries of Messrs. Harris and Drowne are printed (pp. 86–135) as introductory to the main paper, and contain much interesting information respecting the experiences of the party and their work, as well as important information on the character of the islands visited and their natural products. Then follows 'General Remarks about the Fauna of the Galapagos Islands' (pp. 136–142). The material available for investigation by the authors numbered "not less than 3075 skins from the expedition under Mr. Harris, and the Baur collection of about 1100 skins," besides access to Gould's and Salvin's types in the British Museum. The Baur collection, now principally in the Tring Museum, contains also Mr. Ridgway's types and topotypes of the species described by him from the Baur collection. "This material," say the authors, "is perhaps larger than any material ever brought together from any area of similarly small dimensions. Although we must admit that we are still sadly in want of biological observations upon many of the birds, and of all knowledge of the nidification and eggs of the land-birds, we can hardly believe that this vast material is 'still too fragmentary to warrant any serious attempt to

solve the problems to which Mr. Darwin first called attention.' If such collections are not sufficient to throw light upon these problems, no collections will ever do so; and we cannot see how the discovery of five or six more subspecies of land-birds, or of some more accidental visitors, can alter our present conclusions." These are: "I. The entire fauna of the Galapagos Islands [was] derived originally from America. II. It is uncertain whether there has ever been a land connection between the various islands and between the islands and the continent or not." In opposition, however, to Dr. Baur's theory that the islands were once connected with America and with each other, and were submerged in or after the Eocene period, it is stated that the geological evidence "is opposed to a former land connection with America"; and that Dr. Baur's supposition that the original number of species on this land-mass was small, and that as this mass of land became submerged, and the few original species which inhabited the whole area, having become restricted to the former mountain-tops, now islands, became differentiated in many different forms through isolation, is less reasonable than the hypothesis that they reached their present homes at different times from the neighboring mainland.

Section V, 'The Birds of Galapagos Islands,' occupies pages 142–199, and includes 108 species and subspecies, of which 9 are given as of either doubtful validity or doubtful occurrence. Of the 65 land-birds all but 5 are forms peculiar to the islands, and there are also nine water-birds peculiar to the islands. The remaining 31 species (excluding the doubtful forms) are for the most part wide-ranging seabirds or North American migrants.

Fourteen new forms have been described from the Harris collection (mostly subspecies), of which six are described for the first time in the present memoir. The most noteworthy of these discoveries is the flightless Cormorant (*Phalacrocorax harrisi* Rothsch.) from Narborough Island, where it was found only in the surf, its wings being too small to enable it to fly.

Compared with Mr Ridgway's 'Birds of the Galapagos Archipelago' (reviewed in this Journal, XIV, July, 1897, pp. 329, 330), there are numerous noteworthy differences, as with the 14 species added by Messrs. Rothschild and Hartert the total number recognized is only 108, as against 105 in Mr. Ridgway's list, while there are important differences in the nomenclature adopted. For example, Messrs. Rothschild and Hartert have for the first time used trinomials for the local forms of Passeres, explaining: "If trinomials are used everywhere else, there is no reason why the birds of the Galapagos Islands should be deprived of this most useful form of nomenclature. In cases where certain individuals of representative forms are hardly, if at all, distinguishable but where a series is easily separable, the recognition of subspecies is inevitable." It thus follows that in many cases where Mr. Ridgway used a binomial, the present authors use a trinomial. Rothschild and

Hartert also decline to recognize the genera *Cactornis* and *Camarhynchus* Gould, placing the whole group of thick-billed Finches, to the number of 35 forms, under *Geospiza*, notwithstanding the enormous difference between the two extremes of the series. (The extraordinary intergradation in the size and form of the bill is shown in Pl. vi of the memoir.) In consequence of the much larger amount of material available for examination, a number of Mr Ridgway's forms are synonymized with others, notably in the genus *Pyrocephalus*, where the number of species is reduced from six to two.

There is yet much to learn of the life histories of the birds of the Galapagos Islands, and probably some new forms to be discovered, but, as our authors claim, little new light is to be expected respecting the origin of the avifauna and its relation to that of other countries. That it is American in origin in respect to all its elements there seems no reason to doubt, and that in the evolution of its forms it presents no features not found, in more or less marked degree, in numerous other groups of islands. — J. A. A.

Salvadori and Festa on Birds of Ecuador.[1] The second and third parts of this report have now appeared, completing this valuable contribution to South American ornithology.[2] The first part included the Passeres oscines, the second part the Passeres clamatores, and the third and concluding part the Trochili and remaining groups. Part I contained 165 species, including 5 new to science and 10 new to Ecuador; Part II included 181 species, with 6 new to science and 7 new to Ecuador, and Part III, 266 species, of which 4 are described as new, and 34 are first recorded from Ecuador. The total number of species enumerated is 611, of which 17 were new to science and 51 new to Ecuador. The report includes much important technical matter, a record of the sex, date and place of capture of the specimens, and references to all the previous Ecuadorian records for each species, giving the localities from which they have been recorded.

Ecuador is considered to be divisible into four physiographical regions, namely, a Western, an Inter-Andean, an Eastern, and the Andean proper, each characterized by differences of altitude, temperature, humidity and vegetation. The birds especially characteristic of these several regions are briefly indicated.

As already noted, this carefully prepared report on Dr. Festa's large collection from Ecuador is not only an important contribution to South American ornithology but an especially valuable addition to our knowledge of the Ecuadorian ornis. — J. A. A.

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[1] Viaggio del Dr. Eurico Festa nell' Ecuador. T. Salvadori ed. E. Festa. Ucelli. Part seconda, Passeres clamatores. Boll. Mus. Zool. ed Anat. Comp. d. R. Univ. di Torino, XV, No. 236, pp. 1–34, Nov. 1899. Parte terza, Trochili-Tinami. Ibid., No. 398, pp. 1-54. Feb. 19, 1900.

[2] For notice of Part I, see Auk, Jan. 1900, pp. 81, 82.

Oberholser on Birds from Central Asia.[1] — Dr. W. L. Abbott, formerly of Philadelphia, has earned an enviable reputation as a scientific and enthusiastic collector, who for a number of years past has devoted himself to natural history exploration, visiting successively parts of East Africa, the Seychelles, Madagascar, the Indian Archipelago, and southern and Central Asia in the prosecution of his work. The United States National Museum has been the recipient of his generous and extensive contributions of excellent material to various departments of zoölogy, but especially to mammalogy and ornithology, thus opening a new field of research to American naturalists, whose opportunities heretofore have largely been restricted to American material.

Mr. Oberholser's paper relates to a small collection of birds from Cashmere and Ladak, numbering 142 specimens and representing 62 species. *Totanus totanus curhinus* is described as new. *Saxicola montana* Gould (not Koch) is renamed *Saxicola oreophila*, and *Perissospiza* (nom. nov.) replaces *Pycnorhamphus* Hume, the latter being preoccupied. Several pages are given to a description of a series of 18 specimens of *Buteo ferox*, which seems to illustrate all the principal phases of plumage of this exceedingly variable species. The collector's notes from the fresh specimens, including measurements, are a valuable feature of the paper. — J. A. A.

Oberholser on a Collection of Birds from Madagascar.[2] — A small collection of birds made by the Rev. James Wills, chiefly near Imerina, in the east central part of the island, numbering 57 species, represented by 110 specimens, and purchased by the United States National Museum, forms the basis of the present paper. All are referred to previously described species, but the exact data respecting time and place of collection of the specimens, and Mr. Oberholser's critical annotations on many of them, and on various points of nomenclature, render the paper of much value. — J. A. A.

Oberholser on Birds from Santa Barbara Islands, California.[3] — This is a list of the birds collected by Mr. Clark P. Streator under the auspices of the Biological Survey of the U. S. Department of Agriculture, April

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[1] Notes on Birds collected by Doctor W. L. Abbott in Central Asia. By Harry C. Oberholser. Proc. U. S. Nat. Mus, Vol. XXII, No. 1195, pp. 205–228. April, 1900.

[2] Catalogue of Collection of Birds from Madagascar. By Harry C. Oberholser. Proc. U. S. Nat. Mus., Vol. XXII, No. 1197, pp. 235–248. April, 1900.

[3] Notes on some Birds from Santa Barbara Islands, California. By Harry C. Oberholser. Proc. U. S. Nat. Mus., Vol. XXII, No. 1196, pp. 229–234. April, 1900.

9–29 and June 24–July 20, 1892. The new forms obtained by Mr. Streator had been already described. The list numbers 26 species, of which about one third are confined to this group of islands. The annotations are mainly technical.

Respecting *Sturnella magna neglecta*, which Mr. Oberholser would recognize "as a full species," he says: "It seems remarkable that any one who has ever heard the striking vocal performances of the western meadowlark should consider it a subspecies of the eastern bird."

If Mr. Oberholser should hear the Meadowlarks sing in certain parts of the Mississippi Valley, as eastern Iowa, Illinois, western Missouri, etc., or even in Florida, he would doubtless place less stress upon the value of the song character of the Western Meadowlark. — J. A. A.

Van Denburg's Notes on Birds of Santa Clara County, California.[1] — Mr. Van Denburg's observations were made mainly at two points in the western range of mountains that traverses Santa Clara County, namely, Los Gatos and Palo Alto, and are "based upon more or less casual observations extending over a period of fourteen years." The list relates only to the land birds, and for these " makes no pretence to completeness in any way." The list is nevertheless an important contribution to Californian ornithology, including 110 species with somewhat extended and very interesting field notes on many of them. — J. A. A.

Bonhote's List of the Birds of New Providence, Bahamas.[2] — The present paper is based on observations made by Mr. Bonhote during a year's residence on the island, and includes welcome notes on the manner of occurrence of the 59 species taken by him. A few others are referred to as seen but not positively identified. Four are recorded for the first time from the island of New Providence, namely, *Prothonotaria citrea*, *Oporornis agilis*, *Piranga rubra* (also mentioned in the introductory remarks as "*Pyranga æstiva*"), and *Totanus solitarius*. — J. A. A.

Richmond on New Species of Birds. — Dr. Richmond has described a new species of *Dendrornis* from Alta Mira, Tamaulipas, Mexico, as *D. striatigularis*,[3] and three new birds from the Province of Trong, Lower Siam, collected by Dr. W. L. Abbott[4]. These are *Æthopyga anomala*, *Criniger sordidus*, and *Turdinulus granti*. — J. A. A.

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[1] Notes on some Birds of Santa Clara County, California. By John Van Denberg. Proc. Amer. Philos. Soc., Vol. XXXVIII, 1899, pp. 157–180.

[2] List of Birds collected on the Island of New Providence, Bahamas. By J. Lewis Bonhote. Ibis, Oct. 1889, pp. 506–520.

[3] Proc. U. S. Nat. Mus. Vol. XXII, No. 1200, pp. 317, 318.

[4] Descriptions of Three New Birds from Lower Siam. By Charles W. Richmond, Proc. U. S. Nat. Mus. Vol. XXII, No. 1201, pp. 319–321.

Bangs on a New Quail-Dove from Colombia.[1]— Mr. Bangs finds that the *Geotrygon* from the Santa Marta region of Colombia, at first referred to *G. linearis*, is subspecifically separable, and he has given to it the name *Geotrygon linearis infusca*. —J. A. A.

Dugmore's 'Bird-Homes.'[2] — Mr. Dugmore here enters a comparatively new field, at least for America. While many half-tone illustrations of birds' nests and young birds have been published of late in ornithological journals and elsewhere, Mr. Dugmore is the first to give us a distinctively illustrated treatise on 'Bird-Homes.' As shown by the title page, the work is limited to the 'Land Birds Breeding in the Eastern United States'; but of course not all the species are illustrated. Of the forty full-page plates, fourteen are in colors, four of these being plates of eggs. The plain half-tones are excellent, and the subjects are well chosen. The colored half-tones, by the three-plate process, are as a rule far from satisfactory, though a few of them are rather attractive, and to some tastes may be very pleasing. Their fault is in the method of reproduction, the results being surprisingly good considering the low cost.

'Bird-Homes' consists of two parts, Part I (pp. 1–33) being general and introductory, and Part II (pp. 35–183) systematic. The species are grouped into categories, under nine chapter headings, according to whether the species builds an open, a covered or an arched nest, on the ground, in open country or in woods, in bushes, trees, or vines, or in holes, and if in holes, whether in trees, walls, banks, etc. The nests of about forty species are illustrated, selected to represent all these various methods of nesting. The species thus succeed each other without reference to their systematic relationships, the chapter grouping, according to character and position of the nests, being intended to aid in the identification of the species. A brief description is given of the nest and eggs of each species, with a statement of its breeding range, followed by a short account of its nesting habits.

The geographical area covered by 'Bird-Homes' is so extended that many of the species are necessarily treated at second hand. We are not sure that the author would not have produced a more valuable book if he had restricted its scope to his own personal observations, and given these

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[1] A New Dove from the Sierra Nevada de Santa Marta, Colombia. By Outram Bangs. Proc. New Engl. Zoöl Club, I. pp. 107–109, May 14, 1900.

[2] Bird Homes. | The Nests | Eggs and Breeding Habits of | the Land Birds Breeding in the | Eastern United States; with | Hints on the Rearing and Pho- | tographing of young Birds | By | A. Radclyffe Dugmore | — | Illustrated with Photographs from Nature by the Author | — [Vignette] New York | Doubleday & McClure Co. | 1900 — 8vo, pp. i–xvi, 1–183, 40 fulpage plates (14 colored), and 10 text illustrations. Price, $200 net.

in greater fullness, so as to make the work strictly an original contribution to the life history of such species as he had had opportunity to study personally in the field.

Pearson's 'Beyond Petsora Eastward.' [1]—While the principal scientific results of the voyages here detailed have previously been published, in 'The Ibis,' 'The Journal of Botany,' and the 'Quarterly Journal of Geology,' 'Beyond Petsora Eastward' will be welcomed by both the general reader and the naturalist as a most interesting contribution to the history of Arctic exploration. Mr. Pearson was accompanied by Colonel Feilden, so well known for his important contributions to the natural history of various portions of the high North, and on the first voyage by the Rev. H. H. Slater, an ornithologist and botanist of large experience, his place being taken on the second voyage by Mr. Frederick Curtis, a student of Guy's Hospital. While the book is written by Mr. Pearson, he acknowledges his indebtedness to Colonel Feilden for the use of his diaries in the preparation of the work. The narrative takes the diary form, which greatly increases its interest for the general reader. Mr. Pearson in speaking of the work in his preface says: "It may be complained that the whole thing is far too 'birdy,' and without doubt birds and their doings occupy the largest portion; but the study of bird-life was the first reason and object of the voyages. Birds also are my excuse for adopting the form of a strict diary; for one of the chief interests connected with the study of their habits during the breeding season is the date at which they complete the various stages from nidification to the appearance of the young birds in full plumage on the wing."

We have here outlined the objects of the expeditions and the method of presentation of the results. It need only be said that every page is full of interest, and especially is the narrative replete with information for the ornithologist. Nearly one fourth of the 88 half tone plates relate to birds, giving excellent representations of the nests and breeding haunts of various Arctic breeding birds, few of which have been previously illustrated. Among them are nests and eggs of the Dotterel, Red-throated Pipit, Rough-legged Buzzard (including young of various ages), Little Stint, Shore Lark, Snow Owl, Read-throated Diver, Brünnich's Guillemot, Red-necked Phalarope, and other species. There is also a colored plate of the eggs of the Little Stint (*Tringa minuta*), showing three sets varying greatly in color.

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[1] "Beyond Petsora | Eastward" | Two Summer Voyages to | Novaya Zemlya | and the Islands of Barents Sea | By | Henry J. Pearson | With Appendices | on the Botany and Geology | by | Colonel H. W. Feilden | London | R. H. Porter | 7 Princes Street, Cavendish Square, W | 1899.— Royal 8vo, pp. i–xiv+1–335, with 1 colored and 88 half-tone plates, and 8 maps and plans. Price, 22s. 6d., nett.

The voyages here described were made in 1895 and 1897. In 1895 considerable time (June 20–27) was spent on the Murman coast of Russian Lapland, and (July 5–15) on Kolguer Island; Novaya Zemlya was reached July 17, and ten days later the party started on their homeward trip, reaching Bergen, Norway, August 9. The expedition largely failed of its original purpose, owing to the condition of the ice and the unsuitableness of the vessel. The purpose of the second expedition was to explore the tundra-land between the Petchora River and the Ural Mountains. Owing to unfavorable weather and ice conditions this country was never reached, and the "Great Tundra, ... lying between the Petchora and Karataikha rivers, yet remains an unknown land, as far as its bird-life during the summer season is concerned." The voyage occupied eleven weeks, and the time was occupied in "interesting work on Waïgatch, Dolgoi Island, and Novaya Zemlya."

The narrative of the two voyages occupies pp. 1–168, and is followed by appendixes on the botany and geology, by Colonel Feilden, of the regions visited, and on the ornithology by Mr. Pearson. Thus 'Appendix G, Ornithology,' contains a summary of the observations on the birds, giving briefly the principal facts, while reference to the index will give a clue to the fuller details. The list altogether numbers 67 species, while tabular lists indicate the species met with at the different points visited; namely, Waïgatch, with 38 species; South Island of Novaya Zemlya, 44 species; North Island of Novaya Zemlya, 32 species; Dolgor Island, 20 species, and Habarova, 25 species.

Of the sixteen species of passerine birds met with, the greater part were seen only in Russian Lapland, the birds found at the other points being the usual Arctic shore birds and water fowl, with a few species of raptorial birds. The colony of Brünnich's Murres found at Nameless Bay, Novaya Zemlya, was not only the largest met with, but "ranks as one of the most important in the Arctic regions." It is illustrated in plates 73 and 74 and described at length on pages 162 and 163. The higher parts of the same cliffs were occupied also by the Glaucous Gull in great numbers, — "handsome, well-fed birds, who looked as if they had not a care in life beyond the selection of the youngsters [young Murres] from the ledges below."

The book is well gotten up, and profusely illustrated with excellent halftone plates, showing the scenic, geological, and floral features of the coasts and islands visited, with many pictures of Lapps and Samoyedes, etc., as well as the many views illustrating bird life. — J. A. A.

Collett and Nansen's Birds of the Norwegian North Polar Expedition.[1]

[1] The Norwegian North Polar Expedition, 1893-1896. Scientific Results. Edited by Fridtjof Nansen, IV. An Account of the Birds. By Robert Collett

— This sumptuously printed brochure of fifty-four quarto pages and a colored plate is compiled by Dr. Collett from the journals and verbal information supplied by Nansen, Sverdrup, and other members of the 'Fram' expedition, and is arranged in four sections. Section 'I, Siberian Coast (autumn, 1893),' (pp .6–13) contains a list of 25 species, of which the Snowflake (*Plectrophenax nivalis*,) observed all along the Siberian coast where a landing was made, is the only passerine bird here met with, and it was seen, as a rule, only singly or a few together. A Falcon (*Falco æsalon*), a Hawk (doubtfully identified as *Archibuteo lagopus*), the Snowy Owl, and a Ptarmigan (*Lagopus lagopus*) were the only other land birds seen, and of these the Owl was the only species numerously represented. The Black-bellied Plover, the Purple Sandpiper and two species of Phalarope (*Phalaropus hyperboreus* and *Crymophilus fulicarius*) comprise the shore birds positively identified. Two species of Geese, the Old Squaw and Eider Duck, the Arctic Tern, the Kittiwake, several species of Gulls (*Larus*), two species of Jaeger, a Loon, and two species of Guillemot make up the list of sea birds, very few of which were seen in any considerable numbers.

Section 'II. The First Summer (1894) in the Ice,' (pp. 14–23) numbers only 9 species, two of which are not certainly identified. The only land bird is the Snowflake, a single individual of which visited the 'Fram' on June 21, 1894, in 81° 49′ N. Lat.; there are no shore birds, and the sea birds are all Gulls, Jaegers, Fulmars and Guillemots. Interest here centers in the Ross's Gull (*Rodostethia rosea*), met with August 3–8, in N. Lat. 81° 5′ to 81° 8′, when eight specimens were shot, all young birds of the year, just old enough to fly. These apparently comprise all that were seen, as the birds shot on the 8th were probably those seen on the 6th. These specimens are of special interest as being the youngest yet taken; they are described in detail and illustrated in two plates (one colored).

Section 'III. The Sledge-journey and Franz Josef Land (1895–1896).' This list (pp. 24–43) contains 15 species, the Snowflake being again the only land bird; it was met with only on Franz Josef Land and the neighboring islands. This section contains very interesting notes on the habits of the Kittiwake, the Glaucous Gull, the Ivory Gull, the Parasitic Jaeger, the Fulmar, the Dovekie, etc., and further very important information respecting the Roseate Gull, which was seen in considerable numbers to the northeast of Franz Josef Land, between July 11 and August 14, including both adult birds and young. "They were not shot, as they were too small to serve as food." No suitable breeding

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and Fridtjof Nansen. Published by the Fridtjof Nansen Fund for the Advancement of Science. Christiania: Jacob Dybwad; London, New York, Bombay: Longmans, Green and Co.; Leipzig: F. A. Brockhans, 1899. 4to, pp. 1–54. 1 plain and 1 colored plate.

place for this species was discovered, although a strip of low bare ground seen on Liv Island may possibly afford it a suitable nesting place. "The last specimens were seen near the Coburg Islands between the 11th and 14th of August. After that they vanished completely, and no specimen was seen during the rest of the journey; and there was thus no sign of their inhabiting any locality in the region between Dickson Sound and Cape Flora."

Section IV is entitled 'The Last Two Summers in the Ice. Northeast of Franz Josef Land, 1895, north of Spitsbergen, 1896.' In this list (pp. 44–53) 19 species are enumerated, several being here for the first time noted, as *Ægialitis hiaticula*, *Xema sabini*, *Fratercula arctica glacialis*, etc. The Snowflake again figures as the only land bird, and Ross's Gull is again met with, having been observed on July 18, 19, and 22 and August 4, 9, and 11, — in all seven specimens being seen, in N. Lat. 84° 27′ to 84° 46′, and all were apparently old birds.

The whole number of species recorded in the four lists is 33, of which some were seen only once or twice, and a few are not positively identified. Five only are recorded in all of the four lists, these being the Snowflake, the Kittiwake, the Glaucous and Ivory Gulls, and Mandt's Guillemot. Respecting many of the species a great deal of very interesting information is recorded, and besides this the memoir is a most important contribution to the ornithology of the high North. The two plates for the first time illustrate the first plumage of the little known Ross's Gull. — J. A. A.

Stone on the McIlhenny Collection.[1] — This is a technical report on the fine collection of 1408 birds of 69 species, secured by Mr. E. A. McIlhenny at Point Barrow, Alaska, from August, 1897, to August, 1898, the publication of Mr. McIlhenny's field-notes being deferred.

Mr. Stone states "The material obtained is the finest yet brought from the Arctic regions, and the series are so full that the molt and variations of plumage in many of the birds, that have not previously been understood are beautifully illustrated." It is therefore fortunate that this valuable collection has been studied by an ornithologist so well fitted for the task as Mr. Stone. Only one form, *Asio accipitrinus mcilhennyi*, proved to be separable but of almost all the others detailed descriptions of changing plumages and extended critical comments on the manner of molting are given, the remarks concerning the Eiders being of special interest and value. Six species observed by Murdoch at Point Barrow were not obtained, and thirteen species were added to Mr. Murdoch's list. — F. M. C.

[1] Report on the Birds and Mammals obtained by the McIlhenny Expedition to Pt. Barrow, Alaska. By Witmer Stone. Proc. Acad. Nat. Sci. Phila., 1900, pp. 4–49 (birds, pp. 4–33). March 24, 1900.

Jones on Warblers' Songs.[1] — Nearly six years ago Mr. Jones requested the members of the Wilson Ornithological Chapter of the Agassiz Association to begin a critical study of the songs of Warblers, and the results of their observations in connection with his own notes, covering a period of fifteen years, and all available published material on the songs of these birds are brought together in this useful and suggestive paper.

Before proceeding to a detailed treatment of the song of each species Mr. Jones discusses the development of the Warblers' song-type, the diurnal and seasonal song periods, the kinds of song, and variability in song. Many Warblers possess two kinds of song, which Mr. Jones designates as Call Songs and Passion Songs. The former is the 'every day' song of the species, which we are glad to see Mr. Jones does not consider as addressed especially to the female, but as an announcement of the bird's presence, a challenge, or reply to a rival, and, to our mind, chiefly as an irrepressible expression of the intense physiological vigor of the season, when it becomes the "passion song," which in response to extreme emotion carries the singer off its feet into the air "on quivering wings to pour out its melody without pause until the inspiration has passed."

With others who have attempted to describe birds' songs, Mr. Jones appreciates the difficulty of their adequate presentation. With most Warblers, especially the Dendroicas, this is particularly true. Musical annotation is of little service; and syllabification can, at the best, give but a vague idea of the original. However, careful descriptions may help us to identify the song, after we have heard it, and Mr. Jones's paper is therefore of value to field students, who uniformly find Warblers the most difficult of our land-birds to identify.

A 'Field Key to the Spring Male' Warblers of North America concludes this excellent piece of work. — F. M. C.

Proceedings of the Nebraska Ornithologists' Union.[2] The Nebraska Ornithologists' Union was organized at Lincoln, Nebr., on Dec. 16, 1899, with the following officers: Prof. Lawrence Bruner, President; I. S. Frostler, Vice-President, Dr. R. H. Wolcott, Recording Secretary; W. D. Hunter, Corresponding Secretary. The papers read at the first meeting are now presented in an octavo pamphlet of some forty pages and include the President's address, 'Ornithology in Nebraska,' in which

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[1] The Songs of Warblers (Mniotiltidæ). By Lynde Jones, M.S., Instructor in Zoölogy, Laboratory Bulletin No. 10, Oberlin College, Oberlin, Ohio, March 20, 1900. Also issued as Wilson Bulletin No. 30. 8vo, pp. 56.

[2] Proceedings of the Nebraska Ornithologists' Union at its First Annual meeting, Lincoln, Nebr., Dec. 6, 1899. Edited by Robt. H. Wolcott. 8vo, pp. 44, 1 pl.

the characteristics of the avifauna of the State are pointed and the educational value of bird study in the schools commented on; 'A Twenty-three years' Record kept by Dr. A. L. Child of Plattsmouth, Neb.,' by Dr. R. H. Wolcott; 'Additional Notes and Observations on the Birds of Northern Nebraska,' by Rev. J. M. Bates, notes on 62 species; 'The Bird Fauna of the Salt Basin, near Lincoln,' by J. S Hunter, with notes on 89 species; 'Some Bird Notes from the Upper Elkhorn,' by Merritt Cary, notes on 208 species; 'Some notes on the Nesting of the Raptores of Otoe County, Nebraska,' by M. A. Carriker, Jr., 'How to Popularize Ornithology,' by Wilson Tout, advocating the study of birds in schools; 'A Plea for the English Sparrow,' by Lawrence Skaw, a native of Denmark who, believing the English Sparrow to be harmless in his native land considers it desirable here; and 'Suggestions as to an accurate and uniform Method of Recording Observations,' by Dr. R. H. Wolcott, recommending a more exact use of terms in describing a bird's relative numbers.

The formation of State Ornithological Clubs is always a matter for congratulation and the first publication of the Nebraska Ornithologists' Union, assures us that this new association will exert a widespread influence in increasing our knowledge of Nebraska birds and in arousing an interest in ornithology in that State. — F. M. C.

Chapman's 'Bird Studies with a Camera.' [1] — In this neat volume the author embodies the results of several years' hard and painstaking labor in a comparatively new field — that of photographing birds in a state of nature. In his introductory remarks the author says: "Bird photography, as I would encourage it, does not mean simply photographing birds; it means the use of the camera as an aid in depicting the life histories of birds." With that end in view, Mr. Chapman has presented us with an attractive and pleasing work which cannot fail to be of the utmost interest to the bird student, because of the great number of ornithological facts recorded therein by the camera.

Chapter I which treats of the bird photographer's outfit, takes up the subject of the camera, lens, shutter, etc. The practical tests which the author has given most of the apparatus now on the market, with the additional advantage of being in a position to compare notes with a wide circle of professional and amateur photographers, and thus reap the benefit of their experience, enables him to speak authoritatively on these

[1] Bird Studies | with a Camera | With Introductory Chapters | on the Outfit and Methods | of the Bird Photographer | By Frank M. Chapman | Assistant Curator of Vertebrate Zoölogy | in the American Museum of Natural History, and Author of Handbook of Birds | of Eastern North America, Bird-Life, etc. | With over one hundred photographs | from Nature by the Author | New York | D. Appleton and Company | 1900 — 12mo, pp. xvi + 218. $1.75.

points. Chapter II describes the methods of the bird photographer. The suggestions given here are offered as hints to the bird photographer, and serve to show what an endless amount of patience and ingenuity are necessary to secure good results.

Hitherto much has been accomplished in the direction of photographing nests and eggs, and in some cases the young birds, but the author of the present volume is the pioneer in this country to attempt making a collection of actual photographs of adult birds with the object of contributing toward their biography. A knowledge of the bird's habits is necessary to successful bird photography, and many details of the daily life of the subject must necessarily be forced upon the student who attempts to portray them. Bird photography, as practised by the author of the present volume, therefore becomes a most instructive teacher of the ornithologist; and many facts will be recorded while engaged in its pursuit, the existence of which might otherwise have escaped notice.

The remaining chapters are devoted to life histories of the species treated. Mr. Chapman's field experiences are charmingly written, and the reader cannot fail to express a desire from time to time that he might have been permitted to actually witness the scenes related.

The numerous magnificent half-tones with which these pages are illustrated — showing in some instances different stages of growth from the downy young to the adult birds — have never been surpassed. Many of these pictures, while they give evidence of the greatest photographic skill, are especially noteworthy because of their scientific interest.

How invaluable would be a series of good photographs of the Great Auk, clustered as they once were in all their abundance on Funk Island? Or one of the immense flocks of Wild Pigeons passing across the sky as in years past. In place of these we must be content with humble description. But through the medium of the present volume, the species treated — the great masses of cliff-nesting water-birds on the Bird Rocks in the Gulf of St. Lawrence, and the armies of Brown Pelicans on their native strand in their Florida home — will be seen by future generations of bird-lovers as they exist at the present time.

Aside from its popular interest to those who wish to get near to nature, this volume cannot be too highly commended for its scientific value; and the photographs of the bird colonies as here depicted, will forever remain monuments to Mr. Chapman's skill as a photographer and as an indefatigable ornithologist.— J. R.

Farr's Check List of New York Birds.[1]— This List was originally prepared by Dr. Farr for use in collecting data for a 'Bulletin' on the birds

[1] Check List of New York Birds. By Marcus S. Farr, D. Sc. Bulletin of the New York State Museum, No. 35, Vol. VII. Albany: University of the State of New York, 1900. 8vo, pp. 193–409. Price, 25 cents.

of New York, a work now well under way and likely to prove a very important publication. It is Dr. Farr's intention "to include all the birds known to occur or to have occurred in our State, and only those forms have been admitted that have actually been taken in New York." As thus limited the list includes 380 indigenous and 4 introduced species, and is followed by a 'Hypothetical List' of 17 species which are likely to occur from their having been taken in adjoining States. The list has been made up with great care and discretion, and shows that the author has his work thoroughly in hand. It is printed on only one side of the paper, leaving the opposite page and wide spaces between the species for annotations, which will prove a great convenience to those wishing to add their own annotations. Dr. Farr states that any corrections or additions to the list will be gratefully received. In the present list the annotations are limited to the rare or accidental species, and consist of footnotes citing the place of record for their occurrence. — J. A. A.

Palmer on Legislation for the Protection of Birds.[1] — This is a very important and timely publication in the interest of bird protection. It serves to show how imperfect and crude most legislation has hitherto been, and clearly points out the necessity for a more uniform and more efficient system of bird laws for the different States and Territories of the United States and the Canadian Provinces. As Dr. Palmer says, "the protection of birds is a national, not a local, question. It deals largely with migratory species which breed in one section, winter in another, and traverse several States in passing to and from their breeding grounds." While absolute uniformity may be unattainable, it "seems to be feasible to secure a much greater degree of uniformity than at present exists." Dr. Palmer has done much to pave the way for this by exposing the defects of present laws on the subject and pointing out how they may be immensely improved. Notwithstanding the increased interest shown of late years in the subject, and the growing sentiment in favor of bird protection, both from economic and æsthetic considerations, still, as Dr. Palmer says, "bird destruction is going on rapidly in the United States, and in many regions there is a marked decrease in the abundance of certain species. Cheap guns, lax laws, the mania for collecting and shooting, and more especially the enormous demand for birds for market and for the millinery trade, are responsible for this reduction in bird life."

Dr. Palmer's brochure is divided into three parts. Part I is entitled

[1] Legislation for the Protection of Birds other than Game Birds. By T. S. Palmer, Assistant Chief, Biological Survey. Prepared under the direction of Dr. C. Hart Merriam, Chief of Biological Survey. Bulletin No. 12, U. S. Department of Agriculture, Division of Biological Survey. Washington, Government Printing Office, 1900. 8vo. pp. 94, 2 pll. and 8 text figures.

'General Discussion of Protective Legislation,' under which is given: 'History of Protective Legislation'; 'Definitions of Game Birds'; Species erroneously considered Game Birds,' as Pigeons and Doves, Flickers, Bobolinks or Reedbirds, Meadowlarks, Blackbirds, and Robins; 'Insectivorous and Song Birds,' as defined in various legislative acts, etc.; 'Plume Birds,' and 'Birds of Prey,' to what extent protected in various States, etc. Then follows a 'List of species protected in each State and in the Canadian Provinces, with penalties for killing the birds and destroying nests and eggs.' Also an enumeration of the birds "specifically exempted from protection" in the different States and Canadian Provinces. Dr. Palmer considers, very properly, that "the rights of ornithologists and bird students should be recognized as well as those of sportsmen," and gives, in tabular form, the requirements of the various States regarding regulations and permits for collecting birds, nests, and eggs for scientific purposes. There is also comment on licenses and other regulations regarding shooting, which relate more especially to game birds, but have a bearing on bird protection in general; on 'Birds in Captivity,' and the prohibition of trapping, netting and shooting. Part I concludes with some account of the different methods and provisions for the 'Enforcement of Protective Laws,' and of the 'Necessity for further State Legislation,' with a review of recent 'Federal Legislation,' as the Hoar Bill, the Teller Bill, and the Lacey Bill. Each of these bills is given in full, with explanatory comment, giving the legislative history of each and stating its scope. Only one of these bills, the Lacey Bill, has become a law.

Part II, 'State Laws for the Protection of Birds,' gives a digest of all State legislation for the protection of birds, as far as this is at present in force. As Dr. Palmer's subject relates only to non-game birds, only those portions of the laws "relating to birds generally, as distinguished from game birds, have been quoted verbatim." Part III relates in a similar manner to 'Canadian Laws for the Protection of Birds.'

Dr. Palmer has here given us in a brief form the results of a vast amount of careful and laborious research and has laid an excellent foundation for future intelligent work, in the line of improved legislation in the interest of bird protection; and we trust that his admirable paper will not only prove a guide, but an incentive, to this end. — J. A. A.

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CORRESPONDENCE.

Formaldehyde as an Aid in Collecting Ornithological Specimens.

To the Editors of 'The Auk':—

Dear Sirs:—At various times during my collecting experiences I have made experiments for the purpose of finding some preservative that would temporarily check decay in an ornithological specimen without having any injurious effect upon the skin of the bird or upon the hands of the operator while preparing the skin for his collection. Various compounds and combinations of arsenic, borax, carbolic acid, corrosive sublimate, etc., had been tried with but partial success and with more or less damage to the operator, the usual result having been some bad sores in any slight cuts or around the finger nails. Formic aldehyd gas (H C O H) had attracted my attention in the journals of the day in connection with its disinfecting and insecticidal properties, but I had not seen any commercial solution of it, and did not know where to find such an article.

In August, 1897, while collecting sea birds on Monterey Bay, California, specimens accumulated more rapidly than it was possible to handle them in that rather warm, damp climate, as had often happened on previous occasions. During this visit I became slightly acquainted with a student from Stanford University who was collecting Zoöphytes, etc., from the bay and discovered that he was using a weak aqueous solution of formic aldehyd to preserve his specimens, and also that this could be purchased under the proprietary name of 'Formalin' with a strength of 40%.

After my return to San Francisco inquiry developed the fact that this solution could be procured at a much lower rate under the trade name of 'Formaldehyde,' which at present writing is sold at 55 cents per pound bottle,—larger quantities being proportionately less.

While examining this collection of Zoöphytes the idea occurred to me of trying the effect of some of this solution upon my birds, as business demanded my presence elsewhere in a day or two and I was anxious to save all the specimens on hand. As the formaldehyde seemed to preserve the starfish and other more delicate forms with only a comparatively slight shrinkage it was reasonable to presume that a small amount injected into the abdomen of a bird would temporarily arrest decomposition of the viscera, and that probably the gas evaporating from the solution would permeate the flesh to a sufficient extent to preserve the bird for two or three days at least.

My new acquaintance kindly supplied me with a little of his solution for experimental purposes. A small glass syringe was procured, a couple

of teaspoonfuls were injected into the viscera of the birds to be experimented upon and, as the stomachs were full of fish, about half a teaspoonful was sent down the gullet, the throat being then plugged with cotton. Also on the afternoon before leaving I pulled the skins off some *Puffinus creatopus* and *P. griseus* that were still left, put some cotton dampened with the solution inside the skins, after they were turned back into natural shape again, and rolled them up in newspaper to be carried in a valise. Two days afterward both the birds in the flesh and the treated skins were found to be in good condition. The former were skinned and put up three days after having been shot, while the latter were scraped and finished as time permitted, the last ones having been five days in this condition. These were kept in a tight box containing a layer of damp sand upon the bottom and except for a slight hardening of the tissues were in sufficiently good shape to make a very fair skin.

These results exceeded my expectations, and further experiments demonstrated the fact that the use of formaldehyde places the collector in a comparatively independent position in regard to the number of specimens he may collect in a day, as with its aid he can keep a number in good condition until time admits of preparing them for his collection.

I came across an old-fashioned veterinary hypodermic syringe at a low figure, and this, with a bottle of saturated solution of formaldehyde accompanies me on all my expeditions. This syringe holds one teaspoonful, and this is sufficient for a bird as large as a Partridge. The sharp needle is punched into the abdomen in one or more places, a few drops are sent down the throat of a bird to be saved, and if to be kept for some days a little is injected into the brain by opening the bill and forcing the needle upwards and backwards between the eyeballs.

In place of a regular hypodermic, a common glass syringe, or even an eye dropper, can be made to answer, especially if the end is heated and drawn out to a sharp point as in an egg-blower.

The amount injected and the strength of the solution must depend upon the size of the bird. Formaldehyde comes in saturated solution of nominally 40%, while from 4% to 10% is what may ordinarily be used. For birds up to the size of a Partridge, 4% is sufficiently strong, from this to the size of a Duck 8 or 10%, and for Geese and very large birds a comparatively smaller amount of the full strength seems more satisfactory than a larger amount of a weaker solution. It is well to avoid, as far as possible, having one's hands come in contact with the strong solution as this is apt to harden the skin of the fingers and cause cracks into which arsenic may be introduced. Upon the basis of the original solution being 40% it is a simple matter to approximate any desired strength by mixing in a separate bottle one part of the solution to so many parts of water roughly estimated.

The strength and amount necessary for different birds will soon be learned with a little practice. If too much or too great a strength is used upon small birds the body becomes more or less hardened and dry, mak-

ing it exceedingly difficult to skin the specimen. Care must also be taken to avoid using more than is absolutely necessary in the throat, as the thinness of the gullet allows the formaldehyde to act directly upon the skin of the neck, which is apt to become so stiff and dry as to cause it to tear in the effort to skin the bird over the head. A few drops only will suffice for the preservation of this part of the bird, except in the case of a large crop full of decomposing food. When properly treated with this solution, and properly cooled off in the first instance, birds will keep a week even in warm weather in sufficiently good condition to make a fair skin.

The saturated solution of formaldehyde is 40%, but it evaporates easily and is usually about 36%. As it is greatly adulterated, sometimes being nothing but pyroligneous or acetic acid mixed with impure methyl alcohol, and even when comparatively pure is much reduced in strength by unscrupulous dealers, it is much wiser to procure the article from an absolutely trustworthy source than to buy indiscriminately.

As a convenient insecticide and preventive of mildew formaldehyde fills a long felt want. When a burner for making the gas (formic aldehyd) is not within reach some of the solution can be poured into dishes and placed in the cases of specimens. It performs its work in a few hours. An occasional fumigation of a collection will prevent all danger from insects and also from mould in an ordinarily dry atmosphere. The gas evaporates like ammonia from the aqueous solution, penetrating every crevice and interstice, and destroys all insect life as well as fungoid growths. It is a wise plan to subject all specimens received in exchange or by purchase to a thorough disinfection, which is easily done in this manner.

Two and a half years' use of formaldehyde has so demonstrated its effectiveness and convenience in the preparation of specimens that all ornithological collectors should become acquainted with its properties. It will be found of the greatest assistance in the field and in the laboratory.

JOSEPH MAILLIARD.

San Geronimo, Cal.

NOTES AND NEWS.

PROF. ALPHONSE MILNE-EDWARDS, an Honorary Member of the American Ornithologists' Union, died in Paris April 21, 1900, at the age of sixty-four years. Prof. Milne-Edwards was of English descent; his grandfather, Bryan Edwards, M. P., was a West Indian planter, who settled at Bruges, France. His father was the well-known eminent zoölogist of Paris, who died in 1885. The son, Alphonse, was associated many years with his father in zoölogical work.

Alphonse Milne-Edwards was born in Paris in 1835; he took his medical degree in 1859, and in 1865 became a professor in the School of Pharmacy. In 1876 he was made, as assistant to his father, Professor of Zoölogy at the Jardin des Plantes, and in 1891 was appointed Director of the Paris Museum d' Histoire Naturelle and of the Menagerie in the Jardin des Plantes, which positions he filled at the time of his death. He was long recognized as a leading authority in mammalogy and ornithology, and also achieved success in other lines of zoölogical research, in connection especially with deep-sea work. In 1881, assisted by a party of savants, he began, under the patronage of the French Government, a survey of the Gulf of Gascony, and later in the 'Travailleur,' and later still in the 'Talisman,' extended his work to the Canaries, the Cape Verde Islands, and the Azores. In recognition of the importance of these researches he was awarded the gold medal of the Royal Geographical Society.

His ornithological work is recorded in a long list of papers and memoirs, beginning as early as 1866, but his most notable contributions are his great work entitled 'Recherches Anatomiques et Paléontologiques pour servir à l'Histoire des Oiseaux Fossiles de la France,' published in parts, 1867-1872, consisting of four large quarto volumes, two of text and two of plates; and his 'Recherches sur la Faune ornithologique étiente des Îles Mascareignes et de Madagascar,' 1866–1874. The first of these works made known for the first time the former existence in France of such tropical types as *Trogon*, the Secretary Bird, Parrots of the genus *Psittacus*, *Leptosomus*, and *Callocalia*. In many respects this was a remarkable work, and a most highly important contribution to ornithology. His material was limited generally to the 'long bones,' or the bones of the limbs, and the proper determination of these led to an exhaustive study of the comparative osteology and myology of living birds, the results of which are incorporated in his work. His important researches on mammals, particularly of Madagascar and Central Asia, including the discovery of new and strange forms, do not call for special mention in the present connection.

Edgar Leopold Layard, a Corresponding Member of the American Ornithologists' Union, died at Budleigh Salterton, Devon, England, on January 1, 1900, in his 76th year. We take the following notice of this well-known ornithologist from the April number of 'The Ibis' (p. 404): "Edgar Leopold Layard, C. M. G., ... was elected an Honorary Member of the B. O. U. in 1860, and was therefore one of our oldest as well as one of our most valued correspondents. He was born at Florence on July 23rd, 1824, and entered the Civil Service of Ceylon when twenty-two years of age; but after nine years his health gave way, and in 1855 he accepted the invitation of the late Sir George Grey to a post in the Civil Service at Cape Town. There he founded the South African Museum, and became its first curator; after which he accompanied Sir G. Grey on a special mission to New Zealand, and subsequently became judge and

commissioner under the Slave Trade Treaties at the Cape. Transferred to the Consular Service, he was for some years at Pará, at the mouth of the Amazons; next he was sent to Fiji, where he arranged the cession, and was decorated in 1875; he then resumed Consular Service at Noumea, New Caledonia, and ultimately retired after forty-seven years of hard work. Layard was not a producer of books, and his chief work in this line was 'The Birds of South Africa,' published in 1867, of which a new and revised edition, with the collaboration of Dr. Bowdler Sharpe, made its appearance between 1875–84. It is rather by his many and varied contributions from 1854 almost to the time of his much regretted death that he will be remembered; and a column of closely-printed type in the General Subject Index to 'The Ibis' testifies to his energy in our special subject. Besides these, his bright and pleasant letters to 'The Field,' under his own name or the pseudonym of 'Bos Caffer,' will be familiar to most of our readers; and his genial personality will be greatly missed and regretted by all who have had the pleasure of his acquaintance."

PERCY S. SELOUS, an Associate Member of the American Ornithologists' Union, died at his home in Greenville, Mich., on April 7, 1900. His death was due to the bite of a pet Florida moccasin. Mr. Selous was a great traveller and an enthusiastic naturalist, especially interested in birds and reptiles. He was a member of the Michigan Ornithological Club, and an occasional contributor to various natural history journals, including 'The Auk.'

ALL PERSONS interested in fish and game protection and the protection of our birds, will be glad to learn that a course of lectures, together with field observations and demonstrations on this important subject now constitutes a regular part of the instruction in Cornell University. The course is offered to the junior and senior classes in the New York State College of Forestry, which was established two years ago as one of the colleges in Cornell University, with Dr. B. E. Fernow as Director.

The course is given by Dr. B. W. Evermann, ichthyologist of the U. S. Fish Commission, and consists of lectures, laboratory demonstrations and field observations on the life-histories of the important species of freshwater food and game fishes, their artificial propagation and their protection; the relation of the forest to the streams and lakes and their inhabitants; the relation of the various forestry, logging, milling, mining and irrigation operations to the streams and lakes and to their inhabitants; and the value of the mammals and birds of the forest and how to protect them.

THE DEUTSCHEN ORNITHOLOGISCHEN GESELLSCHAFT will hold its annual meeting at Leipzig, Oct. 5–9, 1900. This is the fiftieth anniversary of the founding of the Society. In the celebration of this anniversary the American Ornithologists' Union is cordially invited to take part. The

program of the meeting indicates that it will be an important and very interesting congress, both scientifically and socially, and any members of the A. O. U. who may be able to attend will not only be cordially welcomed but will without doubt find it a very enjoyable occasion.

THE OUTLOOK for Bird Protection in North America has greatly improved during the last two or three years, which is no doubt due largely to the efforts of the Audubon Societies and the A. O. U. Committee on Bird Protection. A strong impression has been made upon public opinion and popular sentiment, now both strongly in favor of every reasonable measure for saving the birds. This popular sentiment is due to the educational efforts of the friends of the birds, who have been able to impress upon the public the importance of birds to agriculture, as well as their æsthetic interest.

The press has greatly aided the work, not only through the favorable attitude of the daily newspapers, far and wide, but especially through the agricultural journals, which are filled with articles showing that the wanton destruction of birds is working great injury to agricultural interests. The fashion journals have in many instances taken a strong stand against the destruction of birds for millinery purposes, and urge women to abandon the use of birds and birds' plumage for decorative purposes. One of the most pleasing evidences of the working of the leaven of reform in this field is the marked change of attitude on the part of that influential and excellent 'home journal,' 'Harper's Bazar,' which not so very long since was criticized in this magazine for its perverse attitude on the subject of aigrettes. In late numbers of this journal we have noted with pleasure its appeals to women in behalf of bird preservation, and especially its appeal to its women readers to help pass the Lacey bill, then long pending in Congress.

It is especially worthy of note that the two bills mentioned in the last issue of 'The Auk' (April, 1900, p. 200), the Lacey bill in Congress and the Hallock bill in the Legislature of New York, have both become laws, they forming the most important and advanced examples of legislation for the protection of birds thus far enacted. The strongest possible effort was made on the part of bird protectors to secure their enactment, and that they received on their final passage an overwhelming vote in their favor greatly strengthens hope for the future.

The widespread discussion in the public press of bird protection incident to the consideration of the two bills above cited, and especially of the Hoar bill, reintroduced into the Senate at the last session of Congress, but which failed of passage, has not only been the means of arousing public sentiment favorable to the cause, but has greatly alarmed the milliners respecting the effect of such legislation upon their business interest. Recognizing that the drift of public sentiment was thoroughly against the use of birds for millinery purposes, they have made overtures, through official action by the Millinery Merchants Protective Association to the Audubon Societies and the A. O. U. Committee on Bird Protection, pledg-

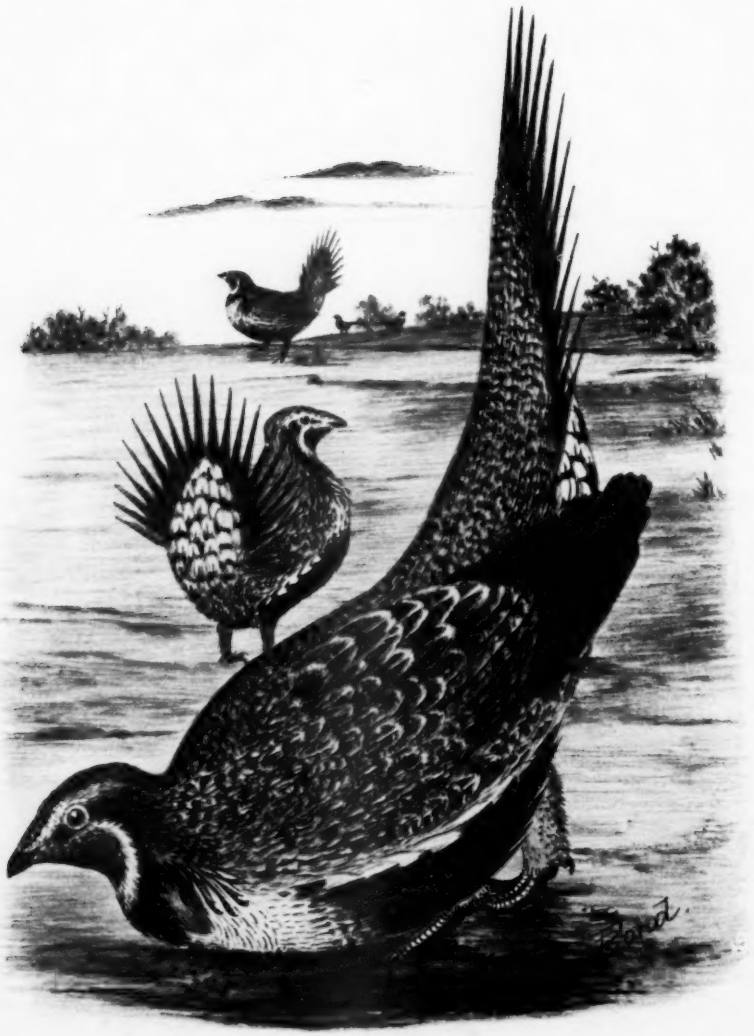
ing themselves "not to kill or buy any more North American birds from hunters or such people who make it a business to destroy North American birds," nor to sell North American birds or their plumage after their present stock has been disposed of, or in any case after January 1, 1902, in case the Audubon Societies and the American Ornithologists' Union will agree not to interfere with their use of the "plumage or skins of barnyard fowl, edible birds or game birds killed in their season," and of "the birds and plumage of foreign countries not of the species of North American birds. Furthermore, it shall be our solemn duty not to assist any dealer or person to dispose of any of their North American birds, if same have been killed after this date [April 21, 1900]. . . . . In return for this pledge, we expect the Audubon Society and the Ornithological Union to pledge themselves to do all in their power to prevent laws being enacted in Congress, or in any of the States which shall interfere with the manufacture or selling of plumage or skins from barnyard fowl, edible birds and game birds killed in their season, and all birds which are not North American birds." This pledge is signed by a large number of the leading dealers in such supplies in New York and other cities.

This appeal is certainly entitled to respectful consideration, since, on the one hand, it guarantees on the part of a powerful association of dealers, that the killing of North American birds for millinery use shall at once cease, and that all traffic in them for such use shall also cease after a certain date, within which specified period the present stock is to be disposed of. There is of course no valid objection to the use of the plumage of barnyard fowls and of game birds killed in season for food; but doubtless many will see grave objection to the continued use of foreign birds. On the other hand, the ineffectual attempt already made to pass the Hoar bill, which is intended especially to prevent the importation of foreign birds for millinery purposes, and the belief on the part of those in position to know best about its future prospects that it cannot be enacted, renders the friends of this measure practically powerless, whatever action the Audubon Societies and the Ornithologists' Union might see fit to take in the matter. Of course no immediate concerted action can be taken by these organizations but it is a subject that may well be considered at a meeting of representatives of the Audubon Societies recently suggested in 'Bird Lore' (June 1900, p. 94) to be held in connection with the meeting of the A. O. U. in Cambridge next November.

ERRATA.—Through an unfortunate oversight in printing Plate V, illustrating Dr. Dwight's paper in the April number of 'The Auk,' the titles of the two figures were transposed. The title of the present Fig. 1 of Plate V should read Fig 2. Neossoptile from *Colinus virginianus* (× 20); and the title of Fig. 2, same plate, should read Fig. 1. Neossoptile from *Lagopus lagopus* (× 20).

For Plate I on pages 153, 156, 157 and 161 read Plate IV.

Page 173, line 19, for *Picoides americanus* read *Picoides arcticus*.



A NUPTIAL PERFORMANCE OF THE SAGE COCK.